Oct. 27, 1970 R. E. HOWELL 3,535,936

GOLF PRACTICE DEVICE

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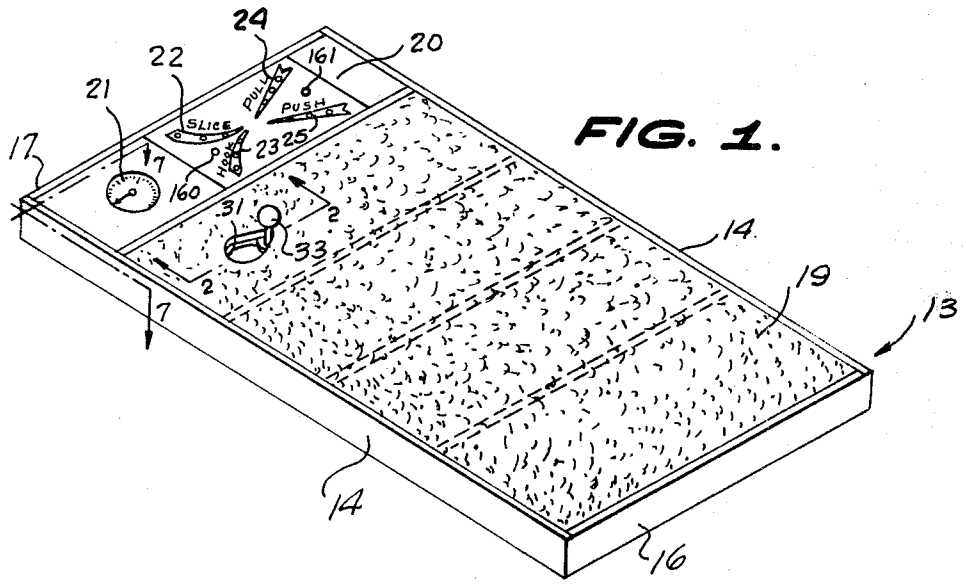


FIG. 1.

FIG. 2.

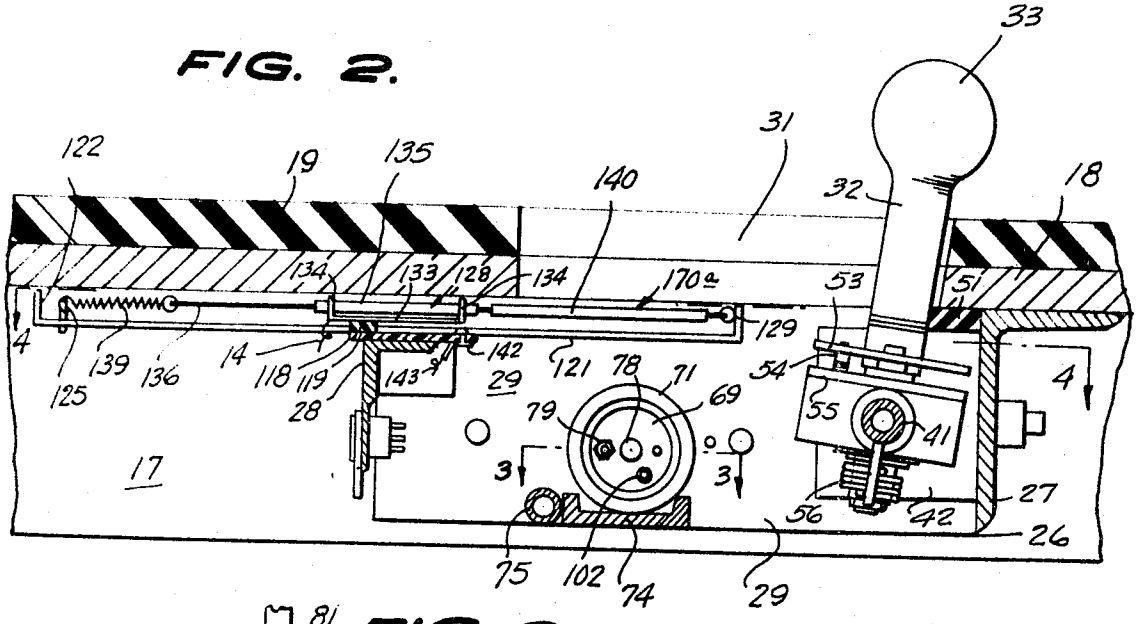
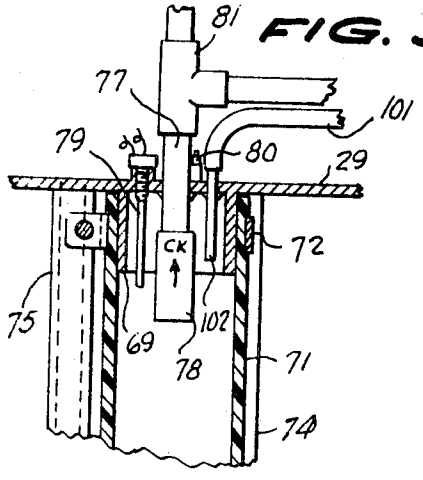


FIG. 3.



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FIG. 4.

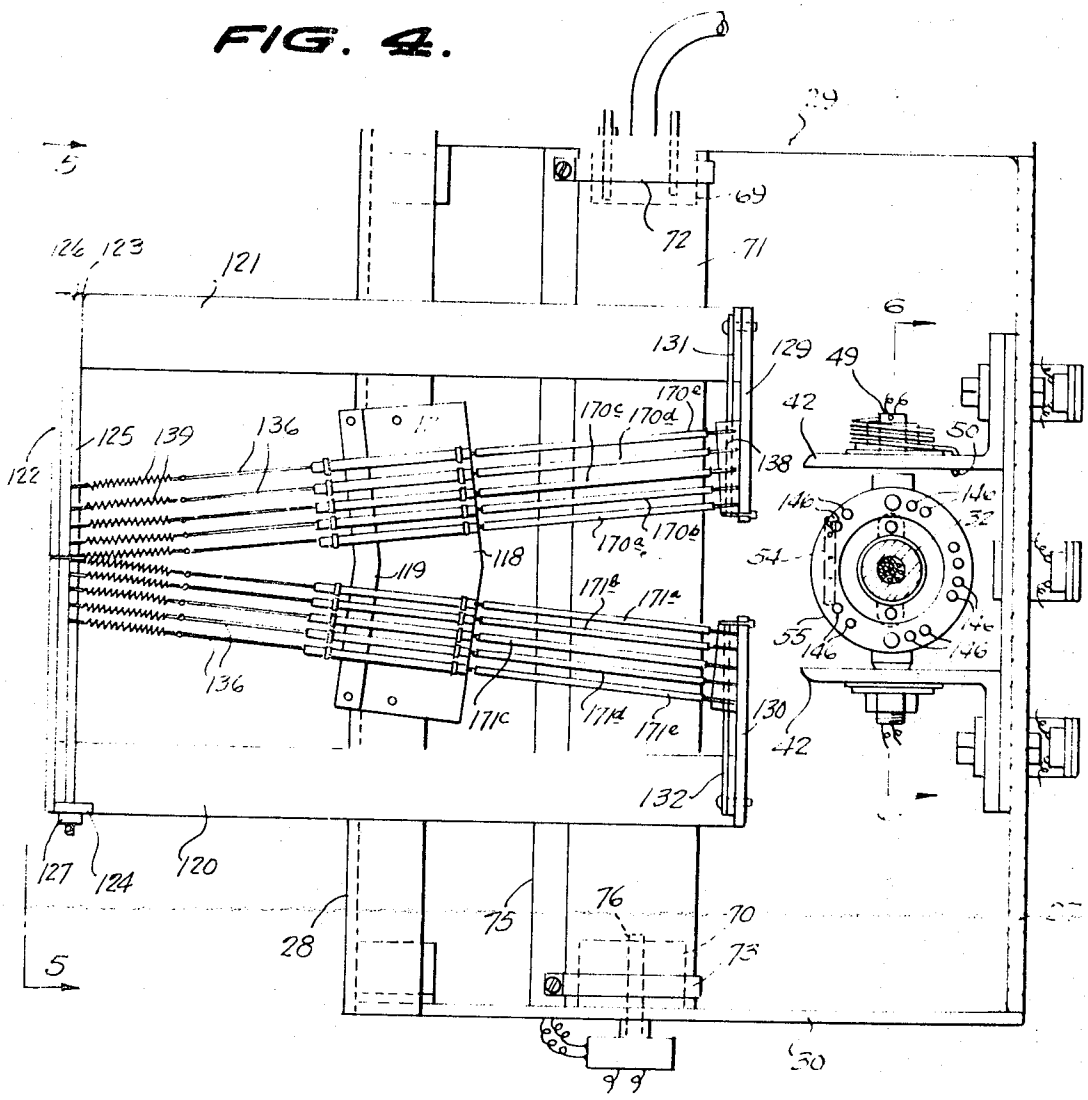
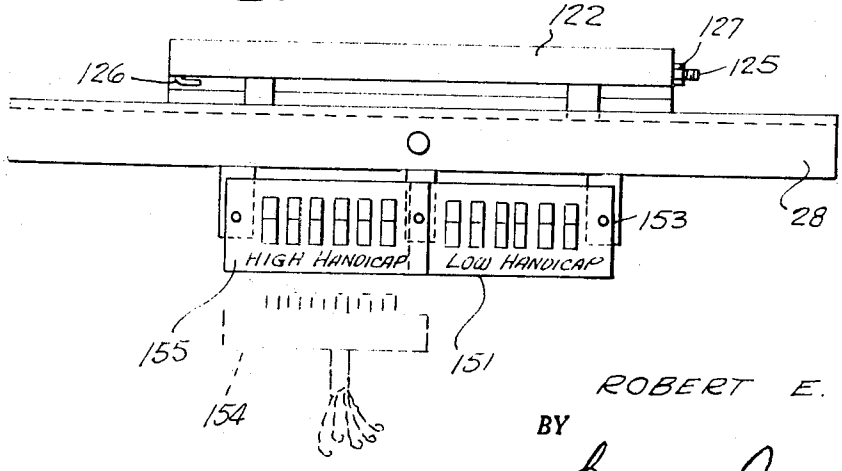


FIG. 5.



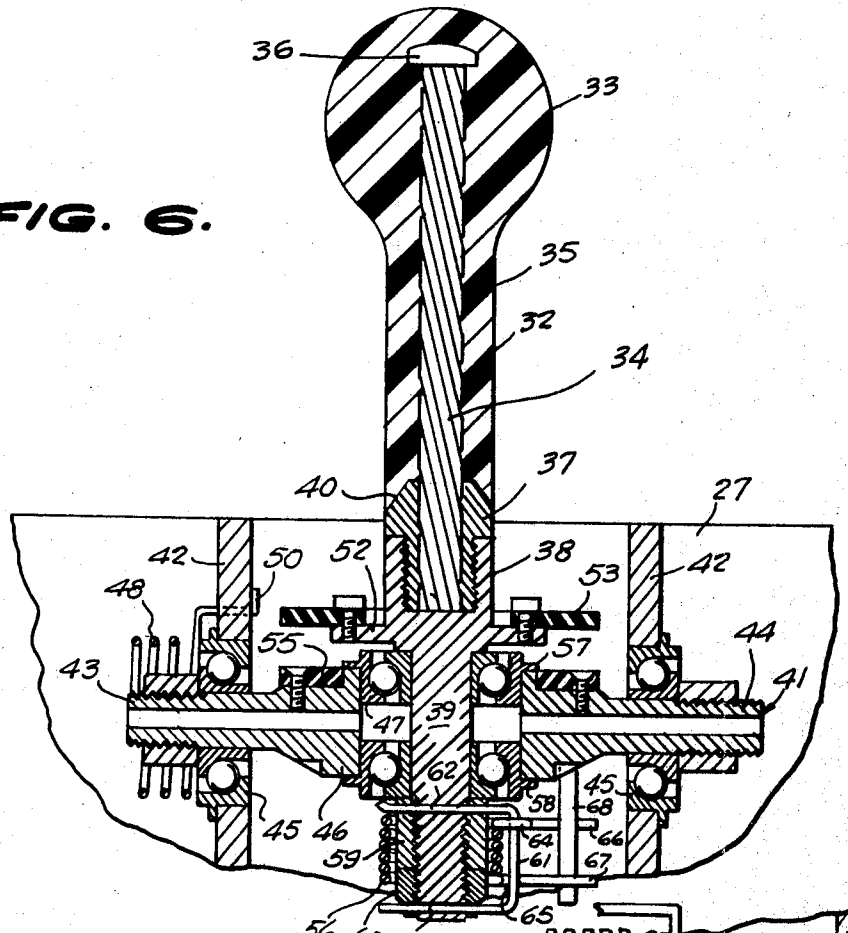
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FIG. 6.



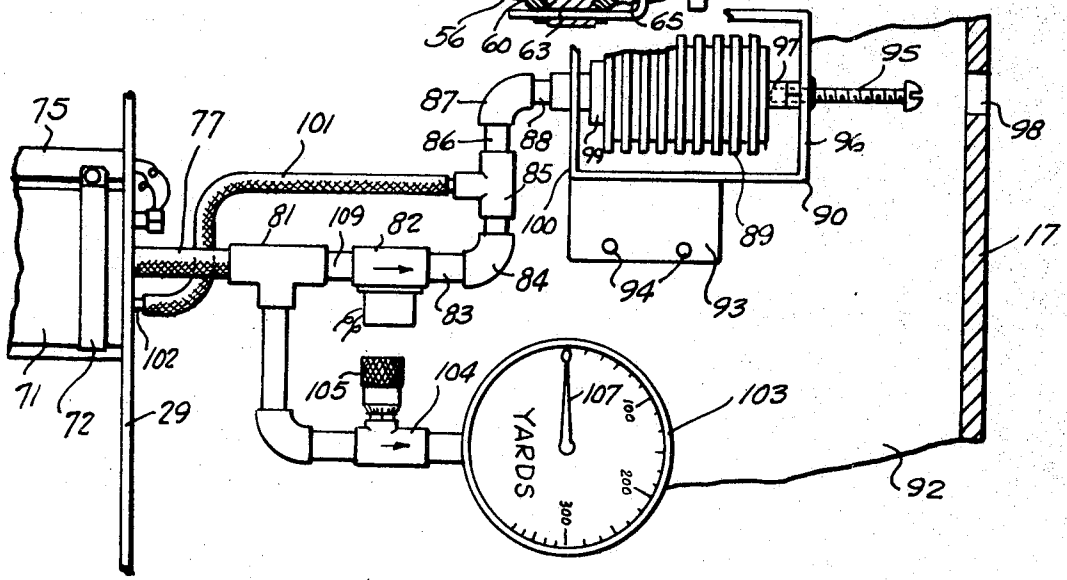


FIG. 7.

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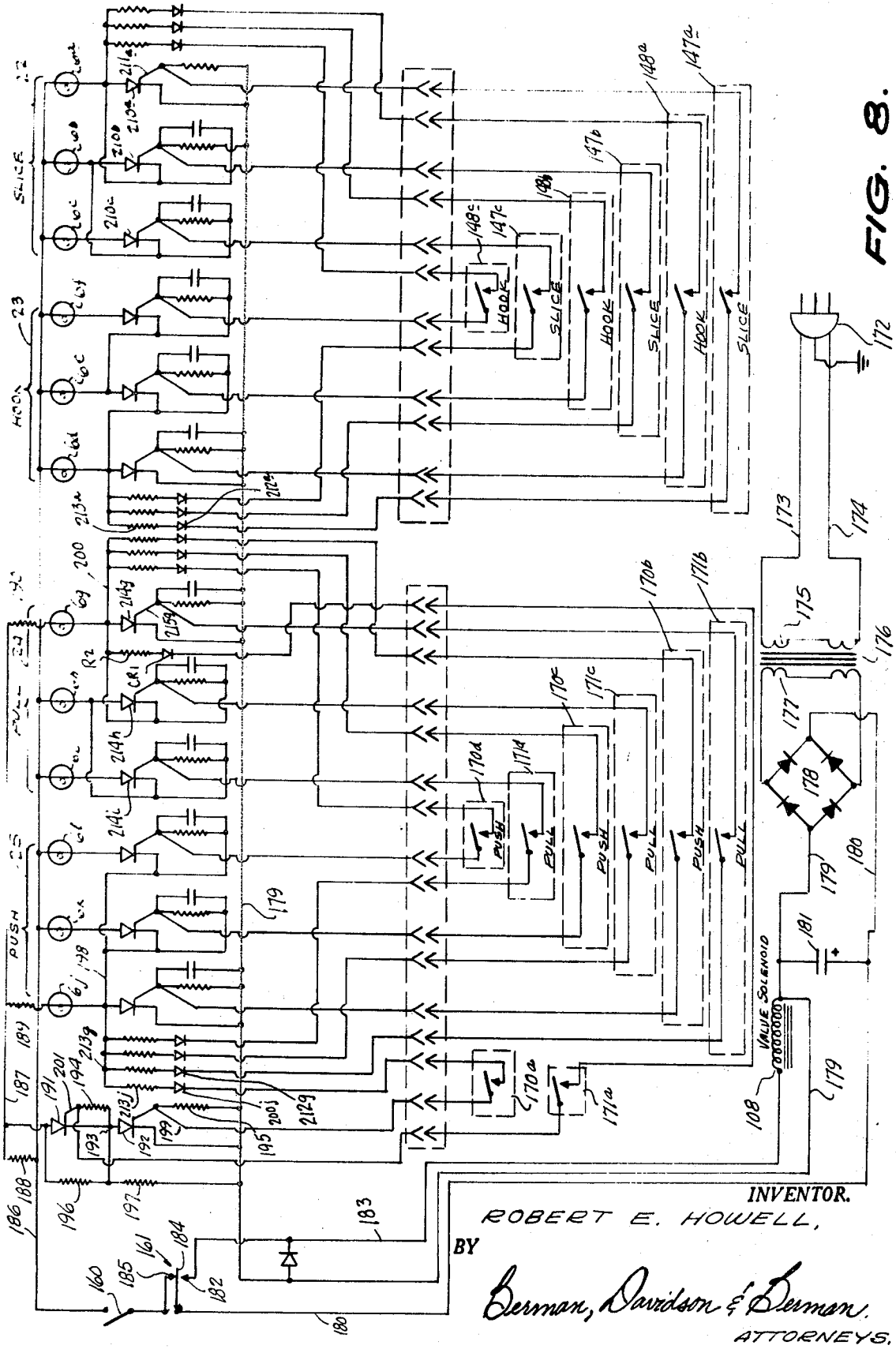


FIG. 8.

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FIG. 9.

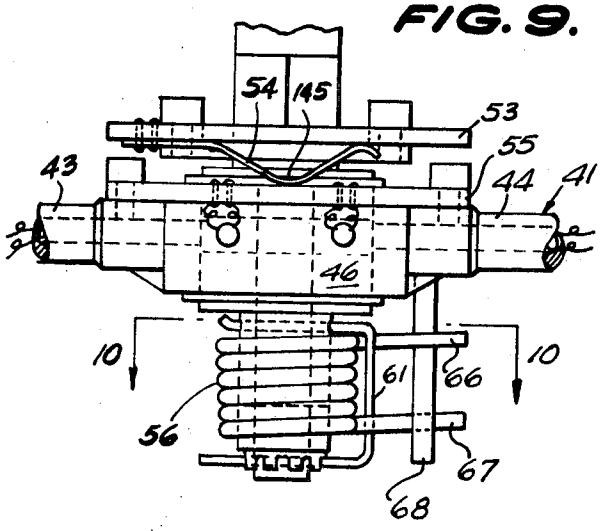


FIG. 10.

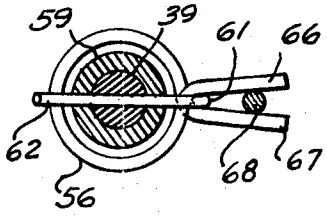


FIG. 11.

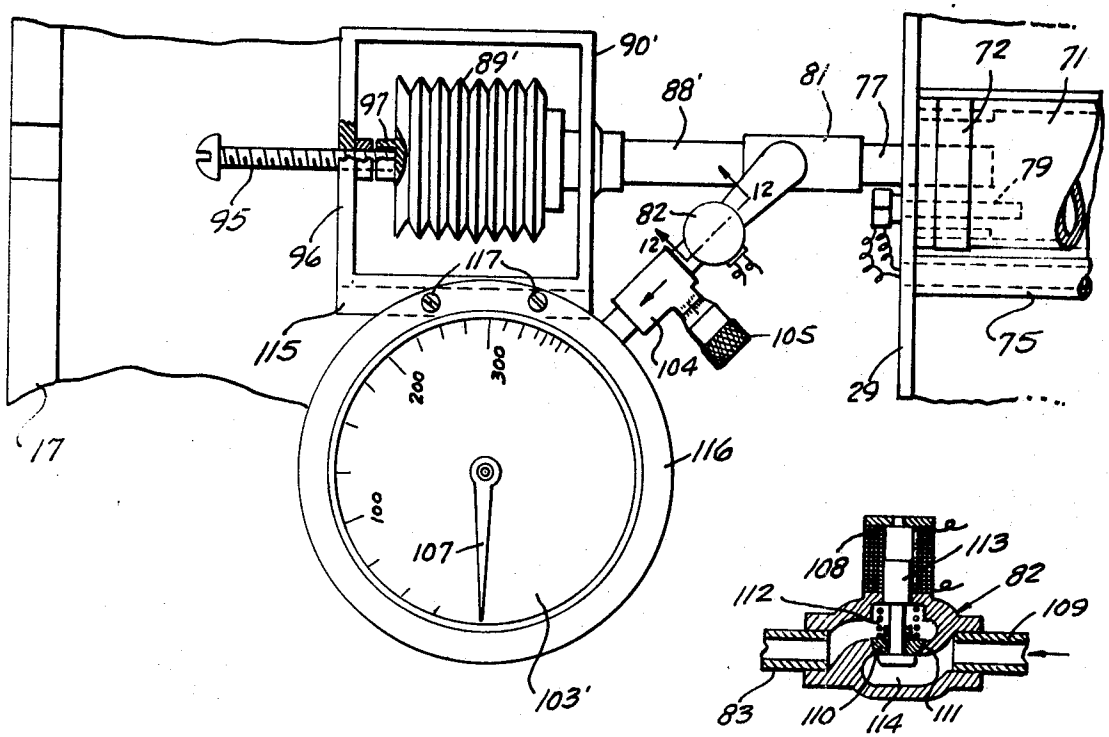


FIG. 12.

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GOLF PRACTICE DEVICE

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Filed Nov. 29, 1968, Ser. No. 779,801
Int. Cl. G01l 5/02; A63b 69/36
U.S. Cl. 73—379 23 Claims

ABSTRACT OF THE DISCLOSURE

A golf practice device consisting of a platform on which an upstanding post carrying a simulated golf ball is pivoted and swivelled in a position corresponding to an actual golf ball on a tee. When the simulated golf ball is struck by a golf club held by a person on the platform the simulated golf ball is swung against a flexible conduit filled with fluid. The impact is transmitted by the fluid to a pressure gauge which registers it in terms of yardage. Directional inaccuracy is registered by the simulated golf ball which can rotate and swing laterally as it is struck and can actuate respective switch assemblies, the selection of which depends upon the direction and nature of the drive. Each switch assembly controls a corresponding indicator. The indicators are mounted on the platform in a visual pattern corresponding to the different types of driving faults, such as "slice," "hook," "pull," and "push." The indicators consist of lamps controlled by respective silicon controlled rectifiers triggered by the switch assemblies.

This invention relates to a practice device for golfers, and more particularly to an apparatus on which a golfer may practice driving a golf ball and will be automatically informed as to serious defects in his stroke and also the distance his drive would carry a golf ball.

A main object of the invention is to provide a novel and improved practice device for golfers, the device being relatively simple in construction, being easy to set up for use, being arranged so as to allow a golfer to employ a natural stroke in driving a golf ball, and providing immediate information as to the distance his drive would carry a golf ball, as well as providing information as to whether the ball is being hooked, sliced, pushed, pulled, or a combination of a slice and pull, slice and push, hook and pull, or hook and push, and also the degree in which these took place.

A still further object of the invention is to provide an improved golf practice device which can be cheaply manufactured, which is durable in construction, which is easy to adjust, and which provides valuable information in connection with a golfer's stroke so as to enable the golfer to make necessary corrections and to thereby improve his capability of accurately and efficiently driving a golf ball.

A still further object of the invention is to provide an improved golf practice device on which a golfer can stand in a natural position and perform a simulated golf stroke in a natural manner with a normal golf club which is engageable with a simulated golf ball, the simulated golf ball being caused to move in a manner which accurately describes and grades the golfer's stroke, both as to yardage and as to specific faults in the stroke, the device being provided with a visible indicator which can be easily seen by the golfer using the device, and which gives the golfer an immediate indication as to the nature of his drive, pointing out faults in the drive, if they are present, as well as the yardage value of the drive.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a perspective view of an improved golf practice device constructed in accordance with the present invention.

FIG. 2 is an enlarged fragmentary vertical cross-sectional view taken substantially on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary horizontal cross-sectional view taken substantially on the line 3—3 of FIG. 2.

FIG. 4 is a horizontal cross-sectional view taken substantially on the line 4—4 of FIG. 2.

FIG. 5 is an elevational view taken substantially on the line 5—5 of FIG. 4.

FIG. 6 is an enlarged fragmentary vertical cross-sectional view taken substantially on the line 6—6 of FIG. 4 and showing the detailed construction of the simulated golf ball and associated parts.

FIG. 7 is an enlarged fragmentary horizontal cross-sectional view taken substantially on the line 7—7 of FIG. 1.

FIG. 8 is an electrical wiring diagram showing the circuit connections of the indicating lamps employed in the golf practice device of FIG. 1.

FIG. 9 is an elevational view of the simulated golf ball-supporting shaft and parts associated therewith, as employed in the golf practice device shown in FIG. 1, drawn susbtantially to the same scale as FIG. 6.

FIG. 10 is a horizontal cross-sectional view taken substantially on the line 10—10 of FIG. 9.

FIG. 11 is a fragmentary horizontal cross-sectional view generally similar to FIG. 7, but showing a modification of the invention.

FIG. 12 is an enlarged fragmentary vertical cross-sectional view taken substantially on the line 12—12 of FIG. 11 and showing the internal structure of a solenoid-controlled check valve employed in the golf practice device.

Referring to the drawings, 13 generally designates an improved golf practice device according to the present invention. The device 13 comprises a generally rectangular platform consisting of longitudinal sidewalls 14, 14 and front and rear transverse end walls 16 and 17 on which is secured a rigid horizontal panel 18, the major portion of which is covered by resilient cushioning material 19, such as rubber, or the like. As shown in FIG. 1, a transverse marginal portion adjacent the rear end wall 17, designated at 20, is employed as an indicating area associated with the device, comprising a pressure gauge 21, calibrated in yardage, and a plurality of indicating segments, designated, respectively, at 22, 23, 24 and 25 containing lamps to indicate the nature of a driving fault, as will be presently described, the lamps being arranged in the respective pattern elements 22, 23, 24 and 25. Thus, the arcuately-shaped pattern elements 22 and 23 are employed to respectively designate a "slice" and a "hook," and the rearwardly-divergent pattern elements 24, 25 are employed to indicate a "pull" and a "push" type of driving defect.

Rigidly-secured to the underside of panel 18 adjacent the indicating area 20 is a rectangular frame, or enclosure, 26 comprising a longitudinally-extending vertical angle bar 27 and opposing longitudinally-extending angle bar 28 connected by transverse vertical plate members 29 and 30. The top edges of the transverse plate members 29 and 30 are secured rigidly to the underside of horizontal panel 18 in any suitable manner, whereas the top edge of longitudinal vertical angle bar 27 is downwardly-offset relative to the bottom surface of panel 18 and the top flange of angle bar 28 is also downwardly-offset from the horizontal panel 18 for a purpose presently to be described.

As shown in FIGS. 1 and 2, the horizontal panel 18 and its resilient covering 19 are formed with a forwardly-flaring aperture, designated generally at 31, through which extends a post member 32 formed at its top end with a simulated golf ball 33, the structure of the elements 32 and 33 being clearly shown in FIG. 6. As shown in FIG. 6,

the post member 32 comprises a core of stranded material such as stranded wire 34 around which is molded a mass of resiliently-deformable material, such as white urethane material, shown at 35, the top portion of which is generally spherical to define the simulated golf ball 33. The top end portion of the wire core 34 is provided with a suitable enlarged anchorage head 36, which may be in the form of a swaged sleeve suitably-secured to the top end of the stranded wire body 34, as by welding, or the like. The lower end portion of the stranded wire core 34 is similarly secured within a metal sleeve member 37, forming the bottom anchorage element for the post 32, the bottom sleeve 37 being threadedly-engaged in a supporting socket 38 integrally-formed on the top end of a shaft member 39.

As shown in FIG. 6, the top end of sleeve 37 is conically-shaped, as shown at 40, to increase the surface area thereof to be molded to the resiliently-deformable covering body 35.

The shaft 39 is swivelly-mounted on a tubular horizontal shaft 41 extending parallel to the angle bar 27 and journaled in a pair of angle brackets 42, 42 rigidly-secured to angle bar 27, as shown in FIG. 4. Thus, the shaft 41 has reduced opposite end portions 43 and 44 which are respectively journaled in the angle brackets 42, 42 by means of ball bearing assemblies 45, 45. The shaft 41 has an enlarged mid-portion 46 and the shaft 39 is swivelly-journaled in said mid-portion by means of a pair of ball bearing assemblies 47, 47 as shown in FIG. 6. Shaft 41 is biased in a clockwise direction, as viewed in FIG. 2, by the provision of a coiled spring 48 surrounding the reduced shaft end portion 43 and having one end anchored to shaft portion 43, as shown at 49 in FIG. 4, and having its other end anchored to the adjacent angle bracket 42, as shown at 50, in FIG. 6. Thus, the spring 48 biases shaft 41 in a clockwise direction, as viewed in FIG. 2, namely, in a direction to urge shank portion 32 into engagement with the edge of a rubber cushioning pad 51 secured adjacent the top corner of angle bar 27 to the bottom surface of rigid panel 18, the pad 51 being located subjacent the convergent rear end portion of the aperture 31, as is clearly shown in FIG. 2.

The top end portion of shaft 39 is integrally-formed adjacent socket 38 with an annular flange 52 on which is secured a disc member 53 of rigid insulating material. Secured to disc 53 at its bottom surface is a generally V-shaped bridging contact spring 54 which is bridgingly-engageable with spaced sets of contacts carried on a subjacent flat disc member 55 of insulating material secured on the enlarged mid-portion 46 of shaft 41 coaxially with shaft 39. Shaft 39 is biased toward a normal centered position by the provision of a coiled spring 56 surrounding its lower end, as shown in FIGS. 6 and 9. Thus, the bearing assemblies 47 are provided with respective retaining flanges 57 and 58 engaging the top and bottom surfaces of the enlarged central shaft portion 46 and clamped thereagainst by a retaining nut 59 threaded on the bottom portion of shaft 39 and locked thereto by a lock nut 60, as shown in FIG. 6. A U-shaped anchoring wire yoke 61 has top and bottom arms 62 and 63 received in transverse bores provided in the threaded lower end portion of shaft 39, as shown in FIG. 6, whereby the yoke 61 is supported by the shaft and frictionally retained thereon. The spring 56 surrounds nuts 59 and 60 and is located between the arms 62 and 63 of yoke 61, the spring 56 having its top and bottom ends formed with loops 64 and 65 which open in opposite directions and which receive the bight portion of the yoke member 61, as shown in FIG. 6. The loops 64 and 65 have outwardly-extending end arms 66 and 67 which extend on opposite sides of and engage a depending pin 68 rigidly-secured to the enlarged mid-portion 46 of the horizontal tubular shaft 41. Thus, the loops 64 and 65 cooperate with the bight portion of the yoke member 61 to bias the shaft 39 toward a normal centered position and to return said shaft

to said position after the simulated golf ball portion 33 has been swivelled, or twisted, by a practice golf stroke. Such swivelling of the simulated golf ball 33 causes the contact spring 54 to be rotated along with the disc 53 and bridges the corresponding contact pairs on the insulating disc member 55, as will be presently described, to provide an indication of the direction and amount of the swivelling action.

The transversely-extending frame members 29 and 30 are respectively formed with inwardly-directed sleeve-like cylindrical conduit elements 69 and 70 which are on a common axis spaced leftward and parallel to the longitudinally-extending frame member 27, as viewed in FIG. 4. Designated at 71 is a resiliently-deformable cylindrical container whose ends are sealingly-connected to the respective sleeve-like conduit elements 69 and 70, for example, by means of conventional hose clamps 72 and 73. The container 71 is supported on an upwardly-facing rigid channel member 74 which is rigidly-connected at its ends to the opposite frame members 29 and 30 and which supportingly-underlies and receives the container 71, as is clearly shown in FIG. 2.

Secured between the frame members 29 and 30 adjacent the channel bar 74 is a conduit 75 employed to house the electrical wire leads from a thermostatically-controlled heater 76 mounted on the frame member 30 with its heating element extending through the sleeve-like conduit member 70 and received in the adjacent end portion of the container 71, as shown in FIG. 4. The thermostatically-controlled heater 76 is provided in order to maintain a substantially constant temperature of the liquid in the contained 71 so as to ensure that its viscosity remains substantially constant at all times.

As will be apparent from FIGS. 2 and 4, the container 71 is located so that its mid-portion is in the path of the simulated golf ball 33 when the post member 32 with the golf ball 33 is rotated in a counterclockwise direction as viewed in FIG. 2. Thus, when the simulated golf ball 33 is struck in a practice drive, it is driven in an arcuate path around the axis of the shaft 41 and strikes the mid-portion of the container 71 with an impact which is transmitted to the liquid in the container, which, in turn, provides a yardage indication in a manner presently to be described.

As shown in FIG. 3, a conduit 77 extends through and is sealingly-secured in the frame member 29 with its inner end received in the container 71, said inner end being provided with a check valve 78 allowing liquid to flow only out of the container 71 and into the conduit 77.

As shown in FIG. 3, the thermostat for controlling the operation of the heating assembly 76 is mounted in the plate member 29 at this end of the container 71, the thermostatic switch being designated at 79. The thermostat cooperates with the assembly 76 so as to provide control of the heating assembly in accordance with changes in temperature of the liquid in the container 71.

Also mounted in the plate-like frame member 29 adjacent the conduit 77 is a conventional fluid-inlet valve 80, which may be similar to a tire valve, for replenishing the liquid in the container 71 whenever necessary.

Conduit 77 is connected through the main branch of a T-connector 81 and a solenoid-controlled check valve 82 to a conduit 83 which, in turn, is connected by an elbow 84 and the main branch of a T-fitting 85, a conduit 86, and an elbow 87 to the inlet conduit 88 leading to a volume-compensating bellows 89. The bellows 89 is mounted in a frame 90 rigidly-secured in any suitable manner to the main framework of the apparatus. For example, the platform may be provided with a bottom plate-like flange 92 in this region and the bellows frame 90 may be secured thereto, for example, by the provision of a lug 93 on the bellows frame which can be fastened rigidly to the plate-like flange 92 by means of suitable fasteners such as rivets 94. The frame 90 is pro-

vided at the end thereof opposite the inlet conduit 88 with a volume-regulating screw 95 threadedly-engaged through the end portion 96 of the frame and rotatably-engaging in an end socket 97 of bellows 89 so that the maximum degree of extension of the bellows may be regulated in accordance with the adjustment of screw 95. For this purpose an aperture 98 is provided in end wall 17 through which a screwdriver may be inserted to engage the slotted end of the screw 95 for the purpose of adjusting the maximum volume of bellows 89. Bellows 89 has its fixed end 99 rigidly-secured to the end portion 100 of frame 90 opposite the adjusting screw 95.

As shown in FIG. 7, the stem portion of the T-fitting 85 is connected by a conduit 101 to a return conduit 102 extending through and secured in frame member 29 and extending into the sleeve-like conduit element 69.

A conventional pressure gauge 103 calibrated in yardage units is connected to the stem portion of the T-fitting 81 through an adjustable needle-valve assembly 104 whose orifice can be adjusted by means of an adjusting knob 105. When an impact is applied to the container 71, for example, by a practice drive, as above mentioned, the impact is transmitted through the liquid in the container 71, which may be oil, or any other suitable liquid, said impact causing the liquid to be forced through check valve 78 and conduit 77 to the gauge 103 through the needle-valve assembly 104, causing the needle 107 of the gauge to swing to a value on the scale of the gauge corresponding to the yardage of the drive. The excess liquid is allowed to return to the container 71 through the return conduit 101 and the conduit 102. By the provision of the check valve 78 and the solenoid-controlled check valve 82, the liquid delivered to the pressure gauge 103 is retained therein, and the reading of the needle 107 is thus held fixed at the yardage value until the liquid is released, the release of the liquid being accomplished by energizing the solenoid 108 of the check-valve assembly 82. Thus, as shown in FIG. 12, the check-valve assembly 82 is provided with a valve element 110 which is biased toward seating position on a valve seat 111 by a coiled spring 112, the valve element being carried by the plunger 113 of the solenoid 108. Liquid entering the valve chamber 114 under impact pressure unseats the valve element 110 against the biasing force of the spring 112 and flows past the valve element 110 into the conduit 83. Under static conditions the spring 112 causes the valve element 110 to resume its seated position, whereby liquid retained in the conduit 109 and the pressure gauge 103 is trapped. When the solenoid 108 is energized, the valve element 110 is lifted from the valve seat 111 allowing the liquid contained in conduit 109 to enter conduit 83 and flow back to container 71 through conduits 101 and 102, allowing the conventional return mechanism of the meter 103 to restore the needle 107 to its zero position. When solenoid 108 is then subsequently de-energized, the valve element 110 will again seat, and the parts will be in their normal positions and will be conditioned to respond to the next practice drive.

The adjusting screw 95 is employed to limit the extension of the bellows 89 and may be merely rotatably-received in the socket portion 97. Thus, the screw 95 may be adjusted inwardly to reduce the volume of the bellows 89, or may be adjusted outwardly to allow increased expansion of said bellows. Thus, the screw 95 serves to establish the effective volume of the bellows 89 and hence, the volumetric capacity of the total system including the impact-responisve deformable chamber 71.

Adjustment of the needle valve knob 105 increases or decreases the area of the orifice of needle valve 104, correspondingly affecting the speed of responses on the pressure gauge 103.

In the modification shown in FIG. 11, the conduit 77 is connected directly to the bellows, shown at 89', through the main branch of the T-fitting 81 and a conduit 88'. The stem portion of the T-fitting 81 is connected to the yardage-indicating pressure gauge 103' through the solenoid-operated check valve 82 and the adjustable needle valve 104. With this arrangement, when an impact is delivered to the resiliently-deformable liquid container 71, the rise in pressure of the liquid causes the liquid to flow directly to the bellows 89' with a certain proportion thereof flowing through the check valve 82 and the needle valve 104 to the yardage-indicating pressure gauge 103'. The liquid is trapped in the pressure gauge by the action of the check valve 82, as above-explained, so that the indication of the needle 107 is held stationary until the liquid in the pressure gauge is allowed to return to the container 71 by energizing the check valve solenoid 108.

In the modification shown in FIG. 11, the support frame 90' of the bellows 89' is formed at one side thereof with a flange 115 to which the peripheral flange 116 of the pressure gauge 103' is secured by means of a pair of fastening screws 117, 117, as shown.

As previously-mentioned, the angle bar 28 has its top flange downwardly-offset relative to the bottom plane of the panel member 18. Secured on the intermediate portion of the top flange of angle bar 28 is a generally V-shaped plate member 118, and secured on the left margin of said plate member, as viewed in FIG. 4, is a strip of insulating material 119.

Rigidly-secured to the top flange of angle bar 28 on opposite sides of the plate member 118 and perpendicular to angle bar 28, are respective flat bar members 120 and 121. The left ends of the strap members 120, 121, as viewed in FIG. 4, are rigidly-connected by a transverse bar member 122. The bar member 121 is formed adjacent bar member 122 with a notch 123, and the bar member 120 is provided adjacent the bar member 122 with an apertured lug 124. Engaged through the aperture in lug 124 is a hook bolt 125 with its hook end 126 engaged in the notch 123, the bolt 125 being provided with a clamping nut 127 which is employed to rigidly-secure the bolt in a position parallel to and adjacent to the bar 122, as shown in FIG. 4.

Rigidly-secured on the insulating strip 119 and arranged symmetrically on opposite sides of the central vertical plane containing the center line of insulating plate 118, are respective groups of switch assemblies designated at 170*a* to 170*e* and 171*a* to 171*e*. In the typical example illustrated in FIG. 4, there are five such switch assemblies in each group, making a total of ten switch assemblies. As shown in FIG. 4, the groups of switch assemblies are arranged in a general V-pattern symmetrical with respect to the vertical central plane containing the axis of post member 32 in its normal upright position.

Rigidly-secured to the right ends of the bar members 121, 120, as viewed in FIG. 4, are inwardly-directed support bars 129 and 130, and secured to said support bars at their inner sides and parallel thereto are respective retainer rods 131 and 132.

Each switch assembly comprises a flexible contact spring 133 having its forward portion suitably-secured rigidly to the insulating strip 119, the contact springs being provided with upturned opposite end portions 134, 134. The end portions 134, 134 are apertured to receive respective insulating tubes 135 of suitable plastic material which are permanently-secured in the apertured upturned end portions 134 in any suitable manner, as by being frictionally-wedged therein. Extending through each tube 135 is a tensioned flexible string or cable 136. Each cable 136 is connected at its right end, as viewed in FIG. 4, to a supporting rod 131 or 132. In the specific example illustrated, five cables 136 are connected to one supporting rod 131, and five other cables 136 are connected to the other supporting rod 132. Suitable spacers 138 may be provided between the adjacent strings or cables 136 to maintain them parallel in their respective groups. The left ends of the cables 136 are connected to the transverse hook bolt 125 by means of tensioning springs 139, as shown in FIG. 4. Thus, one end of each tensioning spring 139 is secured

on the transverse hook bolt **125**, and the other end of the tensioning spring is connected to an end of a cable **136**. The respective cables extend through the insulating tubes **135**. Each cable is provided between its insulating tube **135** and right end supporting rod with a flexible insulating sleeve **140**. The insulating sleeve **140** are in the striking region of the simulated golf ball **33**, and will be engaged by said simulated golf ball where the practice stroke includes a "pull" or a "push" tending to swing the post member **32** away from the longitudinal vertical central plane containing the axis of the post member in its normal upright position. In accordance with the severity of the fault, namely, the magnitude of the "pull" or "push," the innermost or outermost sleeve elements **140** will be engaged by the simulated golf ball by the practice drive.

Connected to each contact spring **133** is a lead wire **141**, and mounted subjacent the right-end portion of each contact spring is a contact element, such as a rivet **142** to which is connected a contact lead **143**. The downward flexure of the right-end portion of a spring **133**, as viewed in FIG. 2, for example, as the result of its sleeve element **140** being struck by the simulated golf ball **33**, causes the right end of the spring to come into contact with its subjacent cooperating contact element **142**, thereby closing the switch. As will be presently explained, the switches are connected in a circuit controlling indicator lamps which become energized responsive to the closure of certain of the switches and which remain energized until the enerbizing circuit is released in a manner presently to be described.

As previously-mentioned, the insulating disc **53** carried by and secured to the flange **52** associated with post member **32** has secured thereto the depending, generally V-shaped contact spring **54** which engages the surface of the insulating annular plate-like member **55** with wiping contact. Thus, the apex portion **145** of spring **54** is engageable on the flat annular insulating member **55** and rotates around the axis of the post member **32** in response to a "slice" or "hook" type of driving defect. Secured in the annular plate-like member **55** at the same radial distance as apex **145** relative to the axis of the post member **32** are pairs of contact members **146**, **146** with which said apex portion **145** is cooperable to define respective rotation-responsive switch assemblies designated at **147***a* to **147***c* and **148***a* to **148***c* in FIG. 8. Thus, the switch assemblies **147***a* to **147***c* are closed in response to "slice" driving defects and the switch asemblies **148***a* to **148***c* close responsive to "hook" driving defects. The pairs of contacts **146**, **146** are spaced at various angular distances from the normal position of the spring crest portion **145** corresponding to various degrees of angular rotation of the post member **32**, and, therefore, to corresponding different degrees of magnitude of the aforesaid driving defects.

In a similar manner, the leaf spring members **133** cooperate with their subjacent contact elements **142** to define the switch assemblies designated, respectively, **170***a* to **170***e* and **171***a* to **171***e* in FIG. 4. The switch assemblies defined at the upper portion of the showing of FIG. 4 close in response to the type of driving defect known as a "push" and are designated at **170***a* to **170***e* in FIG. 8. The switch assemblies defined at the lower portion of the showing of FIG. 4 close in response to a driving defect known as a "pull" and are designated at **171***a* to **171***e* in FIG. 4. Respective switch assemblies will close in accordance with the degree or magnitude of the driving defect, and the greater the magnitude, the more remote from the longitudinal central plane will be the switch assemblies which are closed in response to said defect. Thus, if a simulated drive has a combination of defects comprising either a "push" or a "pull" and either a "hook" or "slice," the drive will cause the closure of certain of the switches **170***a* to **170***e* or **171***a* to **171***e* and also in the closure of certain of the switches **148***a* to **148***c* or **147***a* to **147***c*, depending upon the magnitude of the defects.

The device may be adjusted for sensitivity, namely, for use by either a "high handicap" or a "low handicap" player by the provision of corresponding changeable circuit connections for the fault-responsive switch assemblies above-described. Thus, a "high handicap" multi-terminal plug receptacle **155** and a "low handicap" similar plug receptacle **151** are mounted side-by-side, as shown in FIG. 5, being secured to depending arms **53** carried by the angle bar **28** and being located in a readily-accessible position which can be easily reached from beneath the platform of the device. As will be presently described, the fault-responsive switches appropriate to a "high handicap" player are connected to the associated indicating circuit by a connecting plug engaged with the "high handicap" receptacle **155**, whereas, for a "low handicap" player, the same plug will be engaged with the "low handicap" receptacle **151**, which thereby connects the fault-responsive switches appropriate to such a player, to the same indicating circuit. Thus, for reasons to be presently explained, both of the innermost switch assemblies **170***a* and **171***a* are connected to the indicating circuit through receptacles **151** and **155**, since these innermost switches must be employed for either "high handicap" or "low handicap" players. As will be presently pointed out, when both of the switches **170***a* and **171***a* are closed simultaneously, prior to the closure of other "push" or "pull" switches, no "push" or "pull" indicating lamps will become energized until the indicating circuit is re-set by the actuation of its re-set switch **161** shown in FIG. 8. The drive defect-indicating patterns **22**, **23**, **24** and **25** each comprises three indicating lamps with the outermost indicating lamps indicating the maximum degree of driving fault. Thus, as shown in FIG. 8, there are three "slice" indicating lamps **6***a*, **6***b*, **6***c*, and there are three "hook" indicating lamps **6***f*, **6***e* and **6***d*. Similarly, there are three "pull" indicating lamps **6***g*, **6***h* and **6***i*, and there are three "push" indicating lamps **6***j*, **6***k* and **6***l*. The receptacles **155** and **151** are suitably-wired so that when the associated selecting plug **154**, shown in dotted view in FIG. 5, is plugged into the "low handicap" receptacle **151**, the lamps **6***j*, **6***k*, **6***l*, **6***g*, **6***h* and **6***i* are controlled, respectively, by the switches **170***b*, **170***c*, **170***d*, **171***b*, **171***c* and **171***d*. When the plug **154** is engaged in the "high handicap" receptacle **155**, the lamps **6***j*, **6***k*, **6***l*, **6***g*, **6***h* and **6***i* are controlled, respectively, by the switches **170***c*, **170***d*, **170***e*, **171***c*, **171***d*, and **171***e*, namely, the outermost switches of the array shown in FIG. 4, which would be appropriate for a "high handicap" player.

The receptacles **151** and **155** are wired in a similar manner to the switch elements defined by the pairs of spaced contacts **146**, **146** to permit selection of sensitivity in the same manner as in connection with the "push" and "pull" switches. The arrangement for adjustment of sensitivity is of great value because a "low handicap" player would stroke the simulated golf ball **33** so accurately that none of the lamps would become energized if the device were adjusted for a "high handicap" player, and conversely, a "high handicap" player would stroke the ball so poorly that all possible lamps would be energized if the device were adjusted for a "low handicap" player.

As above-mentioned, the circuitry is designed so that when the switches **170***a* and **171***a* are closed simultaneously prior to the closing of other "push" or "pull" switches, no "push" or "pull" indicating lamps will become energized, and cannot be energized until the re-set switch **161** is actuated. This arrangement is necessary since the simulated golf ball **33** will rebound several times after each initial impact, and could be hit straight and later rebound to one side, and give an erroneous reading. If the simulated golf ball **33** were initially hit to one side sufficiently to clear either inside switch **170***a* or **171***a*, one or more "push" or "pull" lamps will become energized, depending on the side to which the simulated ball is driven and on how many switches were triggered. As will be presently explained, the lamp-control circuit is so designed that the "push" and "pull" lamps will come on only in the follow-

ing order: 6j, 6k, 6l, or 6g, 6h, 6i, or any portion of either sequence. Also, if the first order "push" lamp 6j becomes energized, none of the "pull" lamps will be energized. If the first order "pull" lamp 6g becomes energized, none of the "push" lamps will become energized. This eliminates any error brought about by the rebounding of the simulated golf ball 33.

The energization of a first order "push" lamp 6j or "pull" lamp 6g indicates a hit that was slightly off-center in the direction indicated by the arrow-shaped pattern 25 or 24 containing the lamp. The first and second order "push" lamps 6j and 6k or "pull" lamps 6g and 6h indicate, when energized, a hit that was moderately off-center in the direction indicated by the arrow-shaped pattern 25 or 24 containing those lamps. The energization of the first, second and third order "push" lamps 6j, 6k and 6l, or "pull" lamps 6g, 6h and 6i indicates a hit that was severely off-center in the direction indicated by the arrow-shaped pattern 25 or 24 containing those lamps.

Referring to FIG. 4, it will be seen that the spring contact member 54 is normally located in a position engaging the annular insulating disc 55 at a location between 40° and 50° counterclockwise relative to a set of spaced contacts 146. Thus, if the simulated golf ball 33 is rotated in a clockwise direction upon being struck, namely, if the stroke contains a "slice" component sufficient to rotate contact spring 54 between 40° and 50° in a clockwise direction, as viewed in FIG. 4, the spring bridges the first set of spaced contacts 146, 146. This produces the closure of the equivalent switch 147a, and as will be presently explained, causes energization of the first order "slice" lamp 6a, shown in FIG. 8. It will be seen further from FIG. 4 that another pair of spaced contacts 146, 146, associated with the "slice" detecting switch 147b becomes bridged if the simulated golf ball 33 is rotated an additional 50°, approximately, and this causes the energization of the second order "slice" indicating lamp 6b. If the simulated golf ball 33 is rotated approximately an additional 50°, this produces energization of the third order "slice" lamp 6c.

In the same manner, a "hook" stroke defect causes the simulated golf ball 33 to rotate in a counterclockwise direction, thereby causing the contact spring 54 to move counterclockwise, as viewed in FIG. 4, and bridge a first set of spaced contacts 146, 146, forming part of the first order "hook" detecting switch assembly 148a. Such counterclockwise rotation through an angle of approximately 50° thereby energizes the first order "hook" indicating lamp 6d. Additional counterclockwise rotation through another approximately 50° angle causes closure of the "hook" detecting switch 148b, shown in FIG. 8, thereby energizing the second order "hook" indicating lamp 6e. Similarly, an additional counterclockwise rotation of 50°, approximately, closes the third order "hook" detecting switch 148c and energizes the corresponding indicating lamp 6f.

After each hit, the torsion spring 56 returns the disc 52 and the contact spring 54 to normal position, illustrated in FIG. 4. For reasons presently to be explained, the indicating lamps remain energized until the re-set switch 161 of the circuit is actuated. The underside of the annular insulating plate member 55 is preferably coated with a substantial thickness of suitable insulating material, such as silicone rubber, which may be applied in a thick liquid consistency to the underside of plate member 55. This material covers adjacent wires associated with the contact elements 146 and their solder connections thereto and thus, acts as a protective covering material for said wires and the soldered connections. The silicon rubber insulating material prevents short circuits and also prevents damage to the wires and their solder connections under conditions of extreme shock and vibration.

As previously-mentioned, the electronic circuit employed is so designed that the "slice" and "hook" lamps will come on only in the following order: 6a, 6b, 6c, or 6d, 6e, 6f, or any portion of either sequence. If the first order "slice" lamp 6a comes on, none of the "hook" lamps 6d, 6e or 6f will come on. If the first order "hook" lamp 6d comes on, none of the "slice" lamps 6a, 6b or 6c will come on. With the circuit thus designed to provide only the above order of energization of the lamps, the spring contact member 54 may engage improper pairs of contacts 146, 146 (for example, by rebounding), and yet only the correct lamp will be energized. Energization of the first order "slice" lamp 6a or "hook" lamp 6d indicates a hit that would have curved slightly off-center in the direction indicated by the arrowhead-shaped pattern 22 or 23 containing those lamps. The first, second and third order "slice" lamps 6a, 6b and 6c, or "hook" lamps 6d, 6e and 6f indicate a hit that would have curved severely off-center in the direction indicated by the arrowhead-shaped pattern 22 or 23 containing those lamps.

As in the case of the "push" and "pull" detection switch circuitry, the pairs of contacts 146, 146 are wired to the receptacles 155 and 151 so as to allow a greater degree of rotation of the simulated golf ball 33 for energization of the first order "slice" or "hook" indication lamp for a high handicap player than for a low handicap player, namely, in accordance with the sensitivity selected by the choice of position of plug 154. With the plug 154 engaged in the "high handicap" receptacle 155, approximately 100° of rotation of the simulated golf ball would be required for energization of the first "slice" or "hook" indicating lamp 6a or 6d.

Conversely, when the plug 154 is engaged in the "low handicap" receptacle 151, a much smaller amount of rotation of the simulated golf ball 33 is required to energize the first order "slice" or "hook" indicating lamps 6a or 6d, namely, the simulated golf ball 33 is required to rotate only approximately between 40° and 50°, sufficient to cause the contact spring 54 to bridge the first adjacent set of spaced contact elements 146, 146. Thus, the positioning of the plug 154 adjusts the sensitivity of the device with respect to detection of "hooks" or "slices" concurrently with respect to the detection of "push" or "pull" driving defects, in accordance with the relative skill of the individuals using the device.

FIG. 8 represents the electrical circuit of the device with the plug 154 engaged in the "low handicap" receptacle 151, and thus, does not include the wiring employed to distinguish between the different physical displacements of the simulated golf ball 33 corresponding to players of "high" and "low" degrees of skill, respectively. It will be seen that the device is energized from a conventional source of alternating current by means of a plug 172 whose prongs are connected by the conductors 173 and 174 of a conventional line cord to the primary winding 175 of a transformer 176. The secondary 177 of the transformer is connected to the input terminals of a conventional full-wave rectifier 178, and the positive and negative output wires 179 and 180 are connected, respectively, to the output terminals of the full-wave rectifier 178, as shown. A filter capacitor 181 is connected across the wires 179 and 180. The valve solenoid 108 is connected between wire 179 and the bottom stationary contact 182 of the re-set switch 161 through a wire 183. As shown, the pole 184 of switch 161 is connected to the wire 180 and normally engages the upper switch contact 185. Thus, as will be readily apparent, when re-set switch 161 is actuated, the pole 184 engages the lower contact 182 and disengages from the upper contact 185. When pole 184 engages contact 182 it energizes the valve solenoid 108 and thus releases the liquid from the pressure gauge 103 or 103' in the manner above-described.

The upper switch contact 185 is connected through the master control switch 160 to a wire 186. One terminal of each of the lamps 6k, 6l, 6i, 6h, 6f, 6e, 6d, 6a, 6b and 6c is connected to said wire 186.

A wire 187 is connected to the wire 186 through a relatively low-value, high-wattage resistor 188, which may, for example, have a resistance value of 15 ohms and a

rated power dissipation of 20 watts. One terminal of each of lamps 6*j* and 6*g* is connected to the wire 187 through a relatively low resistance, the resistance being shown, respectively, at 189 and 190, said resistances being, for example, 33 ohms with a power dissipation of 2 watts.

Connected in series between wires 187 and 179 are a pair of silicon-controlled rectifiers 191 and 192 having a common junction 193, the potential of the wire 187 being brought substantially to that of the wire 179 when both of the silicon-controlled rectifiers 191 and 192 are rendered simultaneously conducting.

The control gate of the silicon-controlled rectifier 191 is connected through a resistor 194 to the common junction 193, and the control gate of the silicon-controlled rectifier 192 is connected through a similar resistor 195 to the wire 179. The resistors 194 and 195 may, for example, be 1000 ohms in value with a power dissipation rating of ½ watt.

A resistor 196 is connected between junction 193 and wire 187 and a similar resistor 197 is connected between junction 193 and wire 179, the resistors 196 and 197 being, for example, 100,000 ohms in resistance value.

The remaining terminal of the indicating lamp 6*j* is connected to a wire 198. The first order "push" detecting switch assembly 170*a* is connected between the gate electrode 199 of silicon-controlled rectifier 192 and the wire 198 through a diode CR1 and a resistor R2. The remaining terminal of the indicating lamp 6*g* is connected to a wire 200 and the first order "pull" detector switch assembly 171*a* is connected between the gate electrode 201 of silicon-controlled rectifier 191 and wire 200 through a similar diode CR1 and resistor R2. The resistors R2 may be of 470 ohms resistance values and the diodes CR1 may be of the 1N270 type.

Referring to FIG. 8, it will be seen that the respective "slice" indicating lamps 6*a*, 6*b* and 6*c* are controlled by silicon-controlled rectifiers 210*a*, 210*b* and 210*c*. Thus, the lamp 6*a* is connected between the current supply wires 186 and 179 to the silicon-controlled rectifier 210*a*, the lamp 6*b* is connected between said supply wires through a series connection of silicon-controlled rectifiers 210*b*, and 210*a*, and the lamp 6*c* is connected between said supply wires through the series connection of the silicon-controlled rectifiers 210*c*, 210*b* and 210*a*. Thus, the lamp 6*b* can only be energized if the lamp 6*a* is previously energized by the firing of the silicon-controlled rectifier 210*a* and the silicon-controlled rectifier 210*b* taking place simultaneously. Similarly, the lamp 6*c* can only be energized along with the energization of the lamps 6*a* and 6*b* because the silicon-controlled rectifier 210*c* is in series with the other two silicon-controlled rectifiers 210*b* and 210*a*. From this circuit arrangement it follows that three probable combinations of energization of the lamps 6*a*, 6*b* and 6*c* are possible, namely, the energization of the lamp 6*a*, alone, the energization of lamps 6*a* and 6*b* together, and the energization of the lamps 6*a*, 6*b* and 6*c* together.

The control gate electrode 211*a* of the silicon-controlled rectifier 210*a* is connected to the positive voltage supply wire 186 through the first order "slice" detection switch assembly 147*a*, a diode 212*a*, a resistor 213*a* and the lamp 6*d*. The diode 212*a* is of the 1N270 type and the resistor 213*a* is approximately 470 ohms with a rating of ½ watt. Thus, when the "slice" detection switch 147*a* closes, silicon-controlled rectifier 110*a* is rendered conducting and energizes the lamp 6*a*. The gate electrodes of the silicon-controlled rectifiers 210*b* and 210*c* are similarly connected to the positive voltage supply wire 186 through the respective second and third order "slice" detection switches 147*b* and 147*c*. Thus, the lamps 6*b* and 6*c* are controlled in the same manner as previously-described in connection with the lamp 6*a*, but require the previous energizations of the preceding order lamps as above-discussed.

The "hook" indicating lamps 6*d* and 6*e* and 6*f* are connected in a similar manner as the lamps 6*a*, 6*b* and 6*c* except that they are controlled, respectively, by the first order "hook" responsive switch 148*a*, the second order "hook" responsive switch 147*b*, and the third order "hook" responsive switch 148*c*. In this case, the gating electrodes of the silicon-controlled rectifiers are connected through the respective "hook" responsive switches to the positive supply wire 186 through the lamp 6*a*. The operation, electrically, however, is the same as in the case of the "slice" indicating lamps.

The first order "pull" indicating lamp 6*g* is connected between the supply wires 186 and 179 through a silicon-controlled rectifier 214*g*, a resistor 190, the wire 187, and a resistor 188. The second order "pull" indicating lamp 6*h* is connected between the supply wires 186 and 179 through the silicon-controlled rectifier 214*h*, the wire 200, and the silicon-controlled rectifier 214*g*. Thus, the energization of the second order "pull" indicating lamp 6*h* requires the simultaneous firing of the series-connected silicon-controlled rectifiers 214*h* and 214*g*. The third order "pull" indicating lamp 6*i* is similarly connected between the wires 186 and 179 through the silicon-controlled rectifiers 214*i*, 214*h* and 214*g* connected in series, and is thus controlled in the manner previously-described in connection with the "slice" and "hook" indicating lamps 6*a* to 6*f*. In other words, the same type of combinations of energization of the lamps 6*g*, 6*h* and 6*i* are available as described in connection with the lamps 6*a*, 6*b* and 6*c*, with the exception that lamp 6*g* must be energized through the wire 187 and that the gating electrode 215*g* of the silicon-controlled rectifier 214*g* is connected through the first order "pull" sensing switch 171*b*, a diode 212*g*, a resistor 213*g*, the wire 198, the lamp 6*j*, and a resistor 189 to the wire 187. The diode 212*g* is the same as the diode 212*a* and the resistor 213*g* is the same as the resistor 213*a*. Thus, the silicon-controlled rectifier 214*g* associated with lamp 6*g* can only be rendered conducting if wire 187 is at a substantially positive potential with respect to negative supply wire 179.

Both of the silicon-controlled rectifiers 191 and 192 are rendered simultaneously conducting by the simultaneous closure of the innermost switch assemblies 171*a* and 170*a*, the closure of the switch 170*a* connecting the gating electrode of silicon-controlled rectifier 192 to wire 186 through wire 199, switch 170*a*, a diode 212*j*, a resistor 213*j*, lamp 6*j*, resistor 189, wire 187 and resistor 188. Similarly, the gate electrode 201 of silicon-controlled rectifier 191 is connected to positive wire 186 through a similar circuit when switch 171*a* is closed. said similar circuit including lamp 6*g* and resistor 190. With silicon-controlled rectifiers 191 and 192 turned on, the wire 187 is, in effect, connected to the negative supply wire 179 through the series-connected conducting silicon-controlled rectifiers 191 and 192, so that the potential of wire 187 becomes very low relative to negative supply wire 179 and, therefore, the silicon-controlled rectifiers 214*g*, 214*h* and 214*i* associated with the "pull" indicating lamps 6*g*, 6*h* and 6*i* cannot be turned on. The "push" indicating lamps 6*j*, 6*k* and 6*l* are connected in a similar manner and they, likewise, cannot be energized when both switches 170*a* and 171*a* are simultaneously closed. This feature prevents energization of the "pull" and "push" detection lamps when the simulated golf ball is hit so accurately, namely, is driven so closely toward a centered direction that it simultaneously closes the switch assemblies 170*a* and 171*a*. Deviations from this direction to either side prevent the simultaneous energization of the silicon-controlled rectifiers 191 and 192 and allow various combinations of energization of the lamps 6*a* to 6*f* to be obtained with respect to the lamps 6*g* to 6*l*.

It will be noted that the first order "pull" indicating lamp 6*g* and the first order "push" indicating lamp 6*j* are connected between the supply wires 179 and 186 through their respective associated silicon-controlled rectifiers, their respective series resistors 189 and 190, and wire 187

and the wire **188**. The resistors **189** and **190** are similar low-value resistors of approximately 33 ohms resistance, and the resistor **188**, as previously-mentioned, is also a low-value resistor of approximately 15 ohms resistance. These low-valued resistors do not prevent energization of the lamps **6***g* and **6***j* when their associated silicon-controlled rectifiers are rendered conducting. However, when silicon-controlled rectifiers **191** and **192** are rendered conducting by the simultaneous closure of switches **170***a* and **171***a*, as above-described, wire **187** is brought close to the potential of wire **179** and the lamps **6***g* and **6***j* cannot be energized.

By the privision of the twelve lamps on the indicating panel area **20**, arranged in patterns corresponding to the direction of ball travel, there are forty-eight combinations of energized lamps, as well as the additional showing obtained with a straight ball (no lamp energization). This makes a total combination of forty-nine indications. No more than six of the twelve lamps can come on at the same time, that is, it is impossible to "slice" and "hook," or "push" and "pull" at the same time. When the device is adjusted for the "low handicap" player and a drive corresponding to approximately 250-yards is hit, each lamp represents a 10-yard deviation to the left or right of a perfect drive. The distance represented by each successive lamp is increased substantially when the device is adjusted for the "High handicap" player.

To facilitate reading the lamps, they are preferably provided with colored lenses in pairs. Since the "pull" and the "slice" compensate one another, and the "push" and the "hook" compensate one another, the corresponding indicating lamp lenses are of the same color. For example, in a typical embodiment of the invention, the pairs of lamps are provided with colored lenses as follows: **6***d* and **6***j* are yellow, **6***k* and **6***e* are orange, **6***l* and **6***f* are red, **6***g* and **6***a* are green, **6***h* and **6***b* are blue, and **6***i* and **6***c* are purple. Thus, with this arrangement, a player can instantly note the direction of his practice drive by observing the areas **22**, **23**, **24** and **25** containing non-paired lighted lamps.

As an example, if the golf practice device **13** is adjusted for a "low handicap" player, and the following lamps are energized: **6***k*, **6***j*, **6***d*, **6***e* and **6***f*, this would represent a drive 10-yards to the left of the fairway center line, since the only lamp not paired is **6***f*, located in the "hook" pattern area **23**.

As shown in FIG. 2, the aperture **31** has its rear end located so that the post element **32** can engage the cushioning element **51** and normally assume an inclination rearwardly of approximately 13° to the vertical. This angle corresponds to the "loft" of the conventional drive, and, therefore, at the instant that the simulated golf ball **33** is hit, its trajectory is similar to that of an actual golf ball going ino flight.

It will be further seen from the structure illustrated in FIG. 6 that the simulated golf ball **33** and post portion **32** associated therewith can be readily replaced, as required, since the lower end portion of the post assembly is provided with the member **37** which can be unscrewed from the socket **38**. Thus, after the simulated golf ball portion **33** becomes excessively worn by many repeated hard impacts, the post assembly can be unscrewed and replaced by a new assembly.

It will be understood that all the parts can be restored to their normal positions after a practice stroke by actuating the re-set switch **161**, which opens the lamp circuits and terminates conduction of their associated silicon-controlled rectifiers. At the same time, the valve solenoid **108** becomes energized to allow the pressure gauge **103** or **103'** to return to its normal zero position. The re-set switch **161** may be of the push-button, manually-operated type which returns to a normal position upon release thereof wherein the pole **184** engages the upper contact **185** and places the circuit in preparation for operation when the manually-controlled master switch **160** is closed.

The above-described apparatus, and illustrated in the drawings, is arranged for use by a right-handed player. A similar apparatus may be constructed for use by a left-handed player by merely reversing the positions of the parts as required for use by a left-handed player employing the platform shown in FIG. 1. Thus, with such an arrangement, the aperture **31** would be reversed in position and located near the upper longitudinal edge of the platform and the simulated golf ball **33** would be provided with a post portion **32** which is normally inclined upwardly and to the left, as viewed in FIG. 1, resting against the edge of a cushioning member **51** located subjacent the small end of the aperture.

It will be noted that the post member **32** is of sufficiently flexible construction to allow the simulated golf ball **33** to be deviated, responsive to a golfer's practice drive, substantially in the same manner as an actual golf ball. Thus, the post member **32** will swivel against the biasing force of the spring **56** in accordance with the "slice" or "hook" components of the practice drive, and it will also be flexed laterally in accordance with the "push" or "pull" components of said drive. The resilient wire core **34** and the rubber coating material **35** forming the body of the post member **32** and the simulated golf ball **33** integrally included therewith tend to restore the post member **32** to its normally straight configuration.

While certain specific embodiments of an improved golf practice device with means to analyze a golfer's stroke have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A golf practice device comprising platform means on which a golfer can stand while swinging a golf club, post means including at its top end a simulated golf ball, means rotatably-supporting said post means in an upstanding position on said platform means, means biasing said post means toward said upstanding position, a deformable container substantially filled with fluid mounted on said platform means in a position to be struck by said post means when said simulated golf ball is driven, and gauge means connected to said container to indicate the impact on the container.

2. The golf practice device of claim **1**, and wherein said platform means is formed with an aperture through

3. The golf practice device of claim **1**, and wherein said platform means is formed with an aperture through which said post means normally extends, said aperture being large enough to allow the simulated golf ball to pass therethrough, said container being located in the path of said simulated golf ball.

4. The golf practice device of claim **1**, and check valve means in the connection between said gauge means and container to retain the fluid delivered to said gauge means responsive to an impact on said container, whereby to maintain the indication shown on said gauge means.

5. The golf practice device of claim **1**, and means swivelly-supporting said post means for rotation around its longitudinal axis, means biasing said post means toward a normal position from which it can be swivelled in either direction around said longitudinal axis responsive to a "slice" or "hook" defect in a golfer's stroke, and means indicating the direction and degree of such swivelling from said normal position.

6. The golf practice device of claim **1**, and wherein said post means is relatively flexible, whereby said simulated golf ball can be deviated laterally responsive to a "push" or "pull" defect in a golfer's stroke, and means indicating the degree and direction of lateral deviation of the simulated golf ball from a centered position as it strikes the deformable container.

7. The golf practice device of claim **1**, and wherein

the means rotatably-supporting said post means comprises transverse shaft means journaled in said platform means, said post means being swivelly-mounted on said shaft means, said platform means having an aperture through which said post means normally extends, said aperture being large enough to receive said simulated golf ball when the post means is rotated downwardly, said container being mounted in said platform means beneath said aperture in a position to be struck by said simulated golf ball when driven, means biasing said post means toward a normal position from which it can be rotated in either direction around its swivel axis responsive to a "slice" or "hook" defect in a golfer's stroke, and means indicating the direction and degree of rotation of said post member around its swivel axis relative to said normal position.

8. The golf practice device of claim 7, and wherein said post means is sufficiently flexible to allow the simulated golf ball to be deviated laterally responsive to a "push" or "pull" defect in a golfer's stroke, and means indicating the degree and direction of such deviation from a centered position substantially simultaneously with the impact of the simulated golf ball with said deformable container.

9. The golf practice device of claim 8, and electromagnetically-controlled check valve means in the connection between said gauge means and container, said check valve means allowing fluid to pass to the gauge means and to retain the fluid delivered to said gauge means responsive to an impact on said container, whereby to maintain the indication shown on said gauge means, and means to release the fluid responsive to energization of said electromagnetically-controlled check valve means.

10. The golf practice device of claim 9, and an extensible bellows connected to said container to regulate the volumetric capacity of the associated fluid system.

11. The golf practice device of claim 7, and wherein the means indicating the direction and degree of the swivelling comprises respective groups of spaced "slice" and "hook" lamps mounted on said platform means, said post means and shaft means having opposing support members rotating relative to each other around the axis of said post means responsive to swivelling of the post means, a bridging conductor carried by one of said support members, respective sets of spaced contacts on the other support member located to be sequentially-bridged by said conductor responsive to swivelling of the post means in opposite directions from said normal position, and respective energizing circuits connected to said lamps through said spaced pairs of contacts.

12. The golf practice device of claim 11, and wherein the lamps of each group are arranged in a series, and means preventing energization of any lamp in the series until the preceding lamp of the series has been energized.

13. The golf practice device of claim 11, and wherein said energizing circuits include respective normally non-conducting silicon-controlled rectifiers, and means to render said silicon-controlled rectifiers conducting responsive to the bridging of the spaced pairs of contacts.

14. The golf practice device of claim 13, and wherein the energizing circuit for at least one of the lamps of each group includes series connections of the silicon-controlled rectifiers associated with the group.

15. The golf practice device of claim 14, and means to simultaneously open the energizing circuits after the post means returns to its normal position.

16. The golf practice device of claim 8, and wherein the means indicating the degree and direction of the deviation of the post means from a centered position comprises respective groups of spaced impact-responsive switch assemblies mounted on the platform means in the path of the simulated golf ball and located on opposite sides of the normal central vertical plane of movement of the post means, respective groups of spaced "push" and "pull" lamps mounted on said platform means, and respective energizing circuits connected to said lamps through said impact-responsive switch assemblies.

17. The golf practice device of claim 16, and wherein the lamps of each group are arranged in a series, and means preventing energization of any lamp in the series until the preceding lamp of the series has been energized.

18. The golf practice device of claim 16, and wherein said energizing circuits include respective normally non-conducting silicon-controlled rectifiers, and means to render said silicon-controlled rectifiers conducting responsive to the closure of the impact-responsive switch assemblies.

19. The golf practice device of claim 18, and wherein the energizing circuit for at least one of the lamps of each group includes series connections of the silicon-controlled rectifiers associated with the group.

20. The golf practice device of claim 19, and a pair of impact-responsive switch assemblies mounted on the platform means and spaced substantially symmetrically at opposite sides of said central plane and located between the first-named groups of switch assemblies in positions to be simultaneously struck by the simulated golf ball, and circuit means including said last-named pair of switch assemblies to prevent conduction of the silicon-controlled rectifiers associated with said lamps responsive to the simultaneous closure of said last-named pair of switch assemblies.

21. The golf practice device of claim 7, and wherein said post means comprises a stranded metal core and a body of resiliently-deformable material molded on said core, said simulated golf ball comprising an integral substantially spherical enlarged mass of said material at the top portion of said body.

22. The golf practice device of claim 21, and wherein the lower portion of said post means comprises a rigid base member swivelly-mounted on said shaft means, the remaining portion of the post means being detachably-connected to said rigid base member.

23. The golf practice device of claim 22, and wherein said base member is provided with an upwardly-facing socket, the remaining portion of the post means having a rigid bottom stud member threadedly-engaged in said socket.

References Cited

UNITED STATES PATENTS

2,715,338	8/1955	Simjian	73—379
3,453,889	7/1969	Anello	73—379

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,535,936 Dated October 27, 1970

Inventor(s) Robert E. Howell

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

Column 4, line 48, "said platform means is formed with an aperture through" should read -- said gauge means is calibrated in driving distance units --.

Signed and sealed this 4th day of May . 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents

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