United States Patent

Cornell et al.

[15] **3,643,959**

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[54] GOLF GAME

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[73] Assignee: **Brunswick Corporation**

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Related U.S. Application Data

[62] Division of Ser. No. 542,414, Apr. 13, 1966, Pat. No. 3,523,689.

[52] **U.S. Cl.**.....**273/176 FA**, 273/176 L, 273/181 K, 273/185 R, 73/432 R

[51] **Int. Cl.**.....**A63b 67/02**, A63b 69/36

[58] **Field of Search**.....273/176, 183, 184, 185, 181, 273/182; 73/379, 432 R

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[57] **ABSTRACT**

The invention is a device for measuring the flight characteristics of a golf ball hit in the ordinary manner by a golfer from a stationary tee against a prepositioned target. The self-healing target, positioned a known distance from the tee, temporarily records the initial direction of the hit within a directional indicating grid on the surface thereof. The target resembles a section of an inverted cone wherein all points thereon in a given horizontal plane are equidistant from the tee, and points in a higher plane are further from the tee. The target absorbs most but not all of the kinetic energy of the ball allowing it to rebound at a low velocity so as to roll along a level ball receiving surface located in front of the target to a spin detection device positioned thereon. Numbered zones on the directional indicating grid represent direction from the tee, and numbered (plus and minus) zones associated with the spin detection device indicate the relative effect of spin upon the shot. By algebraically adding the number of the zone where the ball impacts upon the target and the number of the spin detection zone to which the ball rolls after impact, the golfer obtains a number which designates the directional indicating zone on the target face indicating the direction of the terminal impact point of the ball. A microphone associated with the tee and an electrical sensing element associated with the target measures the approximate distance the hit ball would theoretically travel in the direction of its terminal impact point had it not been intercepted by the target.

10 Claims, 8 Drawing Figures

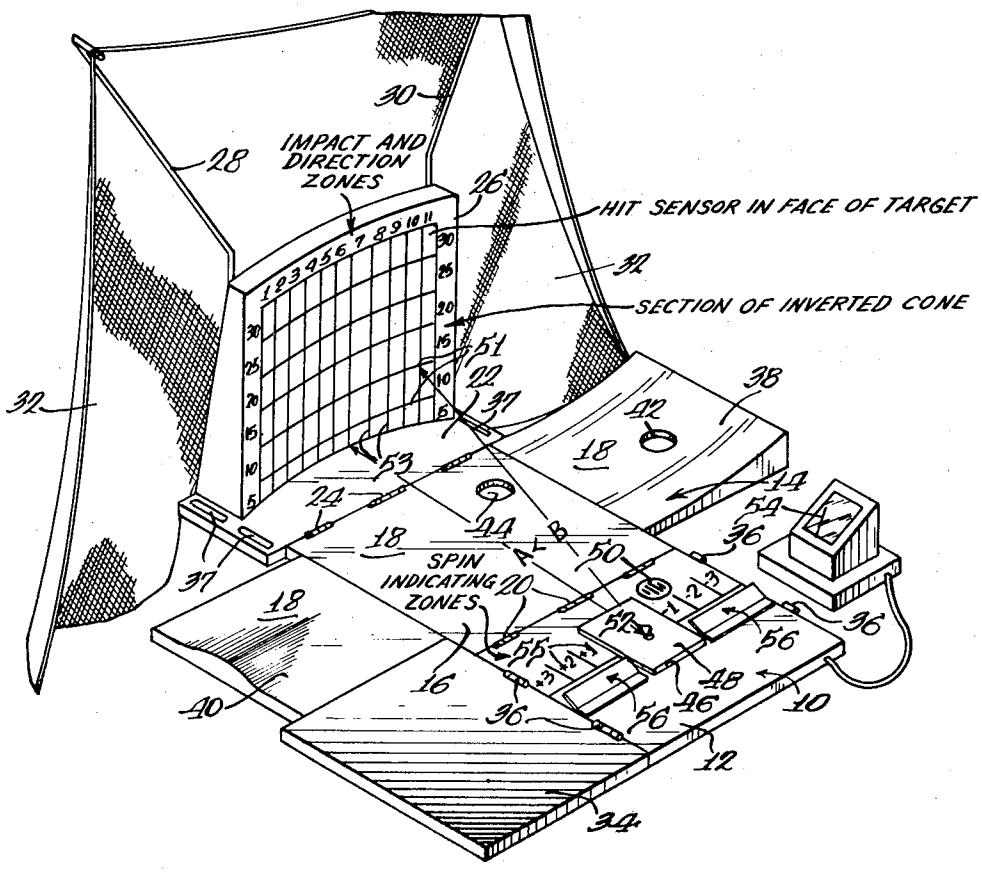


Fig. 1.

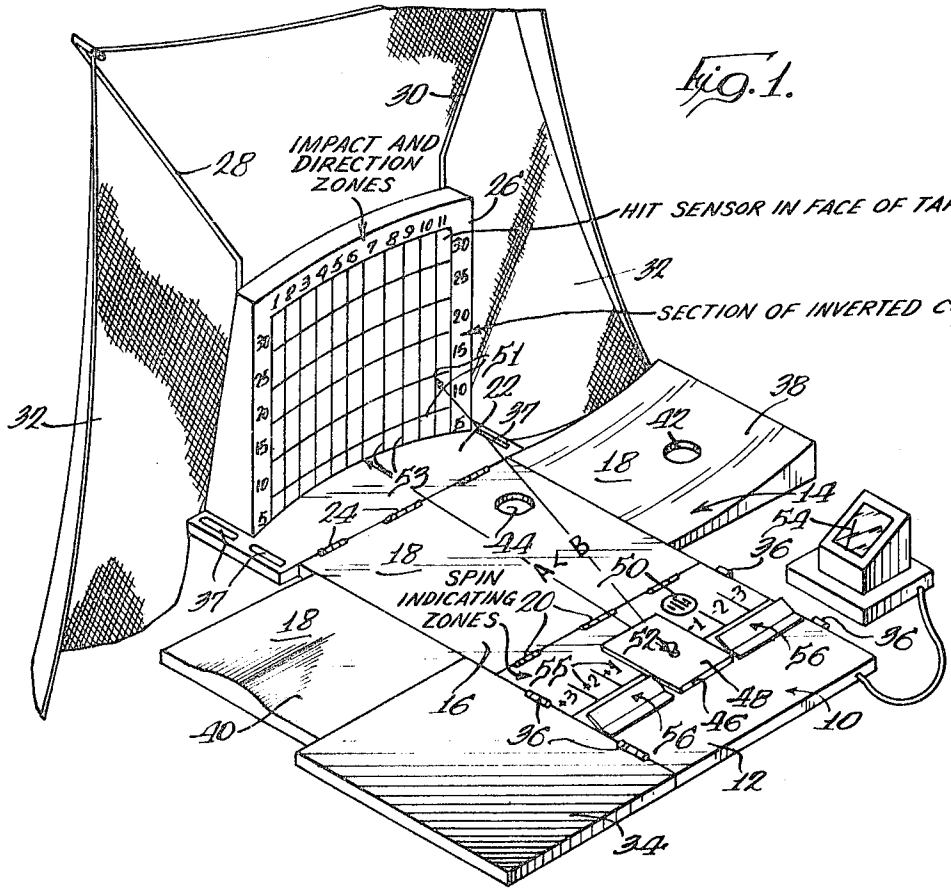
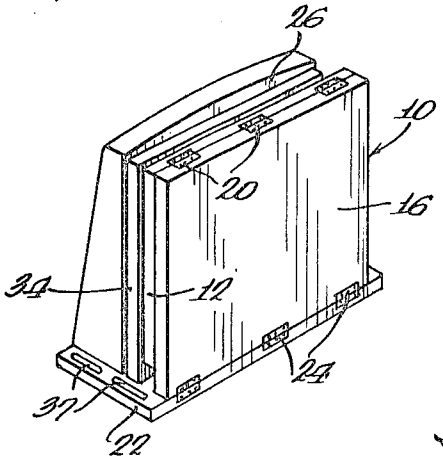


Fig. 2.



IMPACT ZONE NO + SPIN ZONE NO = DIR. ZONE OF THEO. BALL FLIGHT

Fig. 1a.

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Fig. 1.

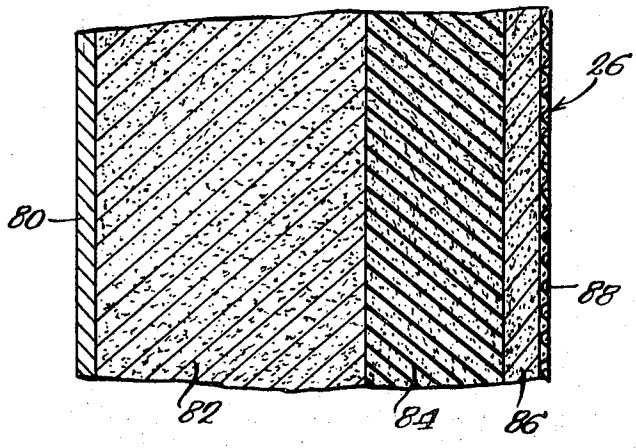


Fig. 3.

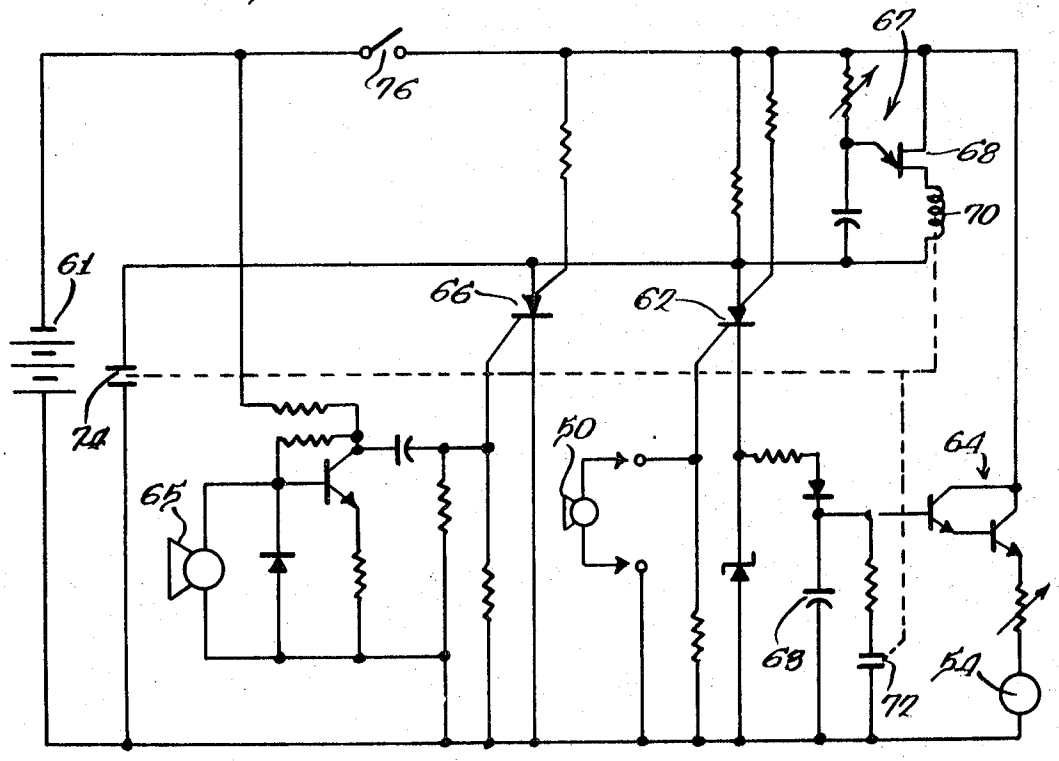


Fig. 5.

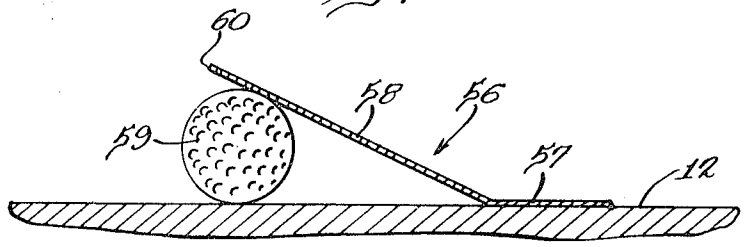


Fig. 6.

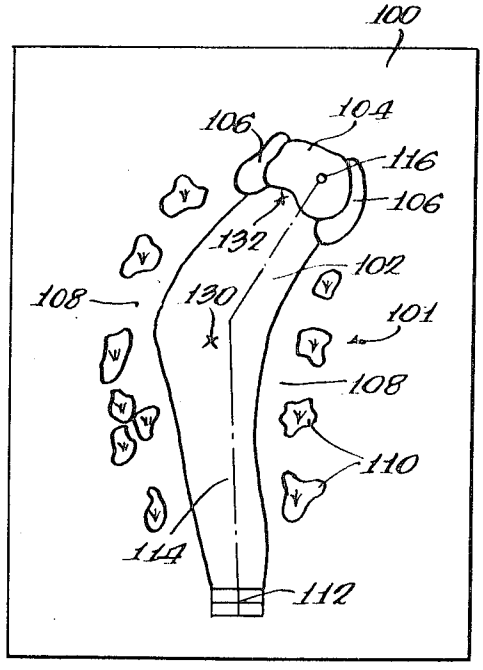
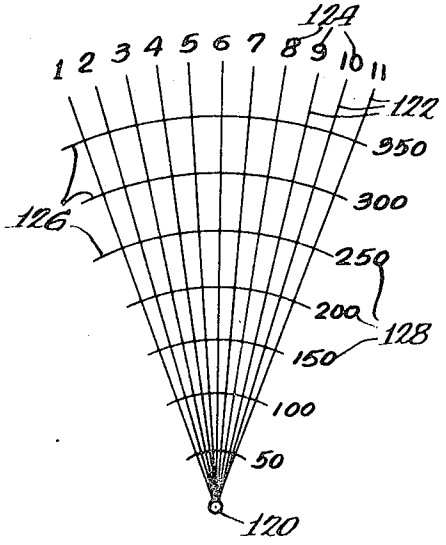


Fig. 7.



GOLF GAME

This is a division of application Ser. No. 542,414 filed Apr. 13, 1966, now U.S. Pat. No. 3,523,689.

Many attempts have been made to provide a golf game such that a golfer may practice or otherwise test his golfing skills without having to travel to an actual golf course. Recently, many of these devices have taken on an extremely sophisticated nature such that much information is given to the golfer about each and every shot that he hits. For example, many such devices utilize computers of relative complexity to give a golfer information relative to the trajectory of a shot including such parameters as spin, elevation, initial direction with relation to the azimuth and the distance the ball would have traveled. Accordingly, the great expense involved in building a computer to perform these functions as well as the fabricating costs of the various detecting elements required to assimilate data relative to the trajectory of a shot has been so prohibitive that the ordinary golfer cannot possibly afford to own such a mechanism.

Additionally, both before and after such sophistication as mentioned above was injected into golf games, many attempts have been made to provide devices that may be used in a home and that are of relatively low cost such that a golfer may practice or play a golf game in his home. Such devices have not proved satisfactory for a variety of reasons. For example, many such simplified golf games do not provide the golfer with information such that he can determine the angle of elevation of his shot, the relation of his shot to the azimuth or the spin on his ball as to whether it was a hook or a slice. Even when an attempt at a simplified golf game has produced a device that is capable of indicating to a golfer one or more of the parameters listed above in addition to the distance parameter, the device has been somewhat bulky and has introduced an additional disadvantage insofar as the target at which a golfer hits a ball is of such a nature that the ball undergoes a relatively elastic collision with the target such that it is rebounded at a relatively high velocity back towards the golfer thus producing the possibility that the golfer may be struck or injured by the rebounding golf ball. Furthermore, such simplified games have generally failed to recognize the putting aspect of golf and are not arranged to permit a golfer to play a simulated hold from tee to green.

It is, therefore, the principal object of the invention to provide a new and improved golf game.

More specifically, it is an object of the invention to provide a golf game of relatively inexpensive construction that is relatively compact such that it will not occupy a great deal of space when arranged for use and yet provide the golfer with the information relative to the distance his shot would have traveled, the elevation of the shot, the relation of the shot to the azimuth, and whether the ball would have hooked or sliced and the degree, if any, of such hooking or slicing and wherein the game structure is collapsible such that it may be easily stored or transported from location to location.

Still another object of the invention is the provision of a golf game comprising a tee from which a ball is adapted to be hit, means for providing information relative to the theoretical trajectory a ball hit from the tee would have taken, and the point a shot would have terminated.

Still another object is the provision of a golf game wherein a target is constructed to provide elevation and azimuth information and including means spaced from the target for receiving a ball rebounding from the target so as to provide the golfer with an indication of whether the ball would have hooked or sliced and the degree of such hooking and slicing, the target being fabricated of materials precluding a relatively elastic collision between the target and the ball such that the ball will not rebound back towards the golfer to possibly injure him while providing sufficient elasticity in such a collision so that the ball will rebound rather slowly towards the ball receiving means to permit a determination of the existence of hooking or slicing.

Yet another object is the provision of such a golf game including a target wherein the construction of the target is such that the point of impact of a golf ball thereon will cause an indentation thereon which may be observed by the golfer, the target being arranged to "heal" after a relatively short period of time such that the indentation will no longer be visible to the golfer.

Other objects and advantages of the invention will become apparent from the following specification taken in conjunction with the accompanying drawings in which:

FIG. **1** is a perspective view of a golf game made according to the invention arranged for the playing of a golf game;

FIG. **1***a* is a block diagram illustrating addition of zone numbers to obtain direction of point of theoretical termination of ball flight had it not impacted upon the target;

FIG. **2** is a perspective view of the golf game disposed in a collapsed condition for storage or transportation thereof;

FIG. **3** is a schematic of a distance determining circuit;

FIG. **4** is a fragmentary vertical section of a target used in the golf game;

FIG. **5** is a vertical section of a ball catching device used in the structure illustrated in FIG. **2**;

FIG. **6** is a plan view of a map of a golf hole used in playing a golf game; and

FIG. **7** is a plan view of a plotting grid used with the map of FIG. **6**.

Referring to FIG. **1**, there is seen a perspective view of an exemplary form of a golf game made according to the invention. The golf game includes a tee area, generally designated **10** formed of a platform **12** which may be suitably constructed from plywood or the like. A putting area, generally designated **14** includes a platform **16** of generally similar dimensions to the platform **12** and may be similarly formed from plywood or the like. The upper surface of the platform **16** includes a covering **18** of relatively long nap carpeting or the like which serves to simulate the turf on a putting green.

The platform **16** has one edge thereof in abutment with the platform **12** and is pivotally connected thereto as by hinges **20**. The opposite side of the platform **16** substantially abuts a base member **22** and is pivotally connected thereto as by hinges **24**. Preferably, the hinges **20** and **24** are arranged such that their upper surfaces do not project above the upper surfaces of the platforms **12** and **16** and the base **22** such that they could influence the direction of a ball by contact therewith as the surfaces of the platforms provide ball return surfaces for a spin detection system as will be seen.

The base **22** supports a generally upright target **26**, the face of which may be displaced from the vertical about 8°–15° toward the tee **10** and into which golf balls are to be driven from the platform **12** by a golfer. As will be seen hereinafter, the rear side of the target **26** (the side thereof facing away from the platform **12**) is formed of metal or the like which serves as a support for the remainder of the elements comprising the target **26**.

The target **26** may have a dimension of about 4 feet by 4 feet while the platforms **12** and **16** may be just slightly smaller. The base **22** in an exemplary embodiment may have a dimension of approximately 2 feet by 4 feet. Accordingly, it will be apparent that a ball hit from the platform **12** toward the target **26** will travel a distance of about 7 feet before encountering the target **26**. It will also be apparent that a so called "shanked" shot or one hit off the heel of the club or a "popup" caused by swinging too far under the ball may miss the target **26** entirely. Accordingly, it is desirable to provide some sort of means for catching balls missing the target **26**. It is also desirable such means do not occupy a great deal of space or add in other respects to the bulkiness of the game. Thus, a pair of arms **28** and **30** are movably mounted on the rear surface of the target **26** as by hinges (not shown) such that they may be swung upwardly and outwardly from the upper corners of the target **26** to support a ball stopping means such as a net **32**. Of course, the length of the arms **28** and **30** and the positioning of their connections to the rear side of the target **26** are arranged

such that the arms **28** and **30** may be folded backwardly to lie in points wholly within the periphery of the target **26** in close adjacency to the rear side thereof.

Because of the relatively small dimension of the tee area provided by the platform **12**, together with the fact that the platform **12** is slightly elevated an inch or 2 above the supporting surface on which it rests, it is desirable to provide a platform of similar height to support the golfer when he is attempting to hit a ball from the platform **12**. Accordingly, a stance area is provided by a platform **34** which is of identical height as the platform **12**. Additionally, the platform **34** is dimensioned so as to be substantially the same size as the platform **12**, the platform **16** and the target **32**. The platform **34** is arranged to be connected to the platform **12** at either of the two sides adjacent the connection of the platform **12** to the platform **16**. Preferably, the connection is in the form of loose pin hinges **36** or the like such that by simply withdrawing the pin from the hinges **36**, the platform **34** may be disconnected from the platform **12**.

As noted above, the platform **34** may be connected to the platform **12** on two sides thereof. When it is connected in the manner shown in FIG. **1**, the golf game is adapted to accommodate a right-handed golfer. When a left-handed golfer desires to use the golf game, it is only necessary to withdraw the pins from the hinges **36**, swing the platform **34** around to the opposite side of the platform **12**, realign the mating portions of the hinges **36** and reinsert the hinge pins to provide a stable connection.

The above-described arrangement of the platforms **12**, **16** and **34** and the base **22** together with the target **26** is such that the golf game may be collapsed so as to occupy a significantly smaller space when it is not in use. In order to collapse the game, it is necessary to disconnect the platform **34** from the platform **12** in the manner just described. The platform **12** may be then folded upon the platform **16**, and the platform **16** together with the platform **12** folded thereover raised to a substantially vertical position such that they substantially abut the target **26**. The platform **34** may then be inserted between the target **26** and folded construction comprised of the platforms **16** and **12**. Additionally, the arms **28** and **30** may be pivoted to their collapsed position within the periphery of the target **26** with the net **32** stored among the arms **28** and **30** in their collapsed positions. The resulting configuration is shown in FIG. **2**. Suitable means (not shown) such as hooks or a belt may be used to maintain the platforms **12**, **16** and **34** in their vertical relation in close adjacency to the target **26**.

It will be appreciated that due to the dimensioning of the various components described above, the golf game in its collapsed condition will form a relatively neat package without outward projections or protrusions which may be suitably covered and easily stored in a minimum of space. Additionally, the golf game is easily transported when it is in its collapsed condition. If desired, elongated slots **37** may be formed adjacent the ends of the base **22** and dimensioned such that a hand may be inserted therein to facilitate the transporting of the device.

In order to form an extended putting area, additional platforms **38** and **40** may be provided. Such platforms also include turf-simulating upper surfaces **18**. As seen in FIG. **1**, the platform **38** includes a cup **42** of conventional dimension. Additionally, the side of the platform **38** opposite the platform **16** has a greater height than the side of the platform **38** adjacent the platform **16**. Thus a putt upon reaching the platform **38** will encounter a gradual upgrade which will tend to prevent the ball from rolling off the rear edge of the platform **38**. When a golfer does not desire to have an uphill characteristic added to his putt, a cup **44** on the platform **16** may be used in place of the cup **42**.

As may be seen in FIG. **1**, the platform **40** has three sides of equal height and a fourth side wherein the height is increased gradually from the ends towards the middle thereof. Thus, when the platform **40** is orientated with respect to the remainder of the assemblage in the manner shown in FIG. **1**, the putt will be characteristic of a downhill putt. However, by orientating the platform **40** with respect to the remainder of the assemblage such that it is rotated 90° in either direction from the position shown in FIG. **1**, putts will have varying sidehill characteristics. By use of additional platforms (not shown) identical to the platform **40** and placed in abutment therewith, it will be appreciated that many different combinations of characteristics may be achieved for a given putt.

When only one or two extensions of the putting area such as the platforms **38** and **40** are used, they may be stored above the base **22** in a manner similar to the platform **34**. Or, if desired, they may be stored adjacent the rear side of the target **26** after the arms **28** and **30** have been collapsed. If additional putting platforms are to be used, it may be necessary to increase the width of the base **22**, such that they may be accommodated thereabove.

Returning now to the platform **12**, a rectangular aperture **46** is cut therein in a position advanced toward the target **26** from the center of the platform **12**. The aperture **46** is adapted to receive mats **48** simulating various lie conditions on a golf course. For example, the mat **48** may be used to simulate the fairway of a golf course while a second mat may be used to simulate the rough. Such mats are customarily formed from brushlike material and form no part of the instant invention.

A golfer will place a ball at a point **52** near the center of the mat **48** and hit the ball with a club toward the target **26**. A microphone **50**, mounted on the platform **12** in close proximity to the point **52**, picks up the sound of a club encountering the ball to trigger a distance determining circuit to be described hereinafter. A similar microphone or vibration sensitive transducer (not shown in FIG. **1**) is mounted on the rear side of the target **26** and provides the distance determining circuit with sufficient information such that distance may be determined. The determined distance is then indicated on a voltmeter such as that shown at **54** which preferably has its scale calibrated in terms of yards.

As will be observed from FIG. **1**, the ball stopping surface of the target **26** is not planar but is in the nature of a portion of the surface of an inverted cone and is developed in the following manner. All points lying in the line of intersection of a horizontal plane and the ball impacting surface of the target **26** are equidistant from the point **52** on the platform **12**. That is to say, that all points on the face of the target **26** in the same horizontal plane are equally spaced from points **52** but that points lying in different horizontal planes and on the face of the target **26** will be differing distances from the point **52**, and generally, the higher the point on the face of the target, the further that point will be spaced from the point **52**, as illustrated in FIG. **1** where the distance designated by line A is shown as being less than the distance designated by line B.

As may be seen in FIG. **1**, the face of the target **26** is provided with a plurality of areas marked off by horizontal lines **51** and vertical lines **53**. The horizontal lines **51** rule off the target facing into a plurality of areas representative of the angle of elevation of a golf shot from five to thirty degrees as indicated in FIG. **1**. The vertical lines **53** rule off the facing of the target **26** into a plurality of areas from one to 11, the sixth area being the central area of the target **26**. It will also be noted that the platform **12** is marked off, on either side of the center thereof into two sets of three areas **55** each. Each area **55** is designated by distance indicia indicated as +1, +2, +3, −1, −2, −3, the minus areas representing hooked shots and the positive areas indicating a sliced shot. A shot without hook or slice spin will rebound across the mat **48**. The arrangement of the various indicia both on the target and on the platform **12** is such that if a golfer hit a ball from the platform **12** and impacted the target **26** in the area common to the 30° elevation and the designation 1, and the ball rebounded from the target **26** such that it went through the +3 area on the platform **12**, it would indicate to the golfer that the shot originally started at a 30° elevation to the extreme left of center, had a spin thereon tending to make the ball slice and would have terminated at a point to the left of center, in this example, in the radial area

designated 4 on the target indicia. Additionally, the distance the shot would have traveled had it not encountered the target **26** will be displayed on the meter **54**. It should be noted that had the ball rebounded from the target through the area **55** marked +2 on the platform, the terminal point of the shot would lie in the radial area marked **3** on the target **26**. Thus it will be apparent that the radial area in which the shot would have terminated is determined by adding the indicia of the area on the platform **12** through which the ball rebounded to the indicia designating the area on the target on which the ball impacted. Using this procedure, it will be apparent that a ball impacting the target in the area **10** and rebounding through the area **55** designated −2 would come to rest in the radial area designated 8 on the target.

The radial area designated 6 on the target **26** represents a straight shot and thus the area in which a shot would have terminated as determined by the sum of the number of radial area of impact on the target and the number of the area **55** on the platform **12** indicates to a golfer whether the shot was straight or to the right or left of center and the degree of deviation from a straight. This information together with the distance indication on the meter **54** indicates to a golfer the ultimate degree of success achieved by the shot, while the hook or slice indication provided by the areas **55** and the elevation angle provides the golfer with an indication of the success of a shot with respect to the execution thereof.

In order to facilitate determination of which of the areas **55** a rebounding ball passed through, a ball catching means, generally designated **56** is arranged behind each of the areas **55** to catch balls passing therethrough. With reference to FIG. **5**, the ball catching means is seen to comprise an angled sheet of flexible material such as polyethylene having a first portion **57** that is secured by suitable means to the platform **12** and a second portion **58** that is angularly rotated to the portion **57** and projects forwardly therefrom towards the target **26**. The angle between the two portions **57** and **58** is suitably chosen such that a golf ball **59** rebounding from the target and running on the platform **12** will pass under the forward edge **60** of the second portion **58** so as to be wedged between the latter and the platform **12**. A ball rebounding from the target **26** will encounter the second portion **58** and will be retained by the ball-catching means **57** in the manner generally illustrated in FIG. **5**. Thus, for a golfer to determine which of the areas **55** the rebounding ball passed through, it is only necessary to observe the location of the ball in the ball catching means with relation to the adjacent areas **55**.

Since the ball-catching means **56** are formed of a flexible material, it will be appreciated that when the structure is collapsed, the second portion **58** will be pressed against the platform **12** such that the latter may be disposed directly against the platform **16** as shown in FIG. **2**. When it is again desired to use the game and the platforms **12** and **16** are unfolded, the inherent resiliency of the material forming the ball catching means **56** will cause the second portion **58** to be restored to substantially the position shown in FIG. **5**.

Turning now to FIG. **3**, there is seen an electronic circuit which may be used for determining the distance a shot would have traveled had it not struck the target **26**. The microphone **50** is connected in conjunction with the trigger of a silicon-controlled switch **62** which is connected across a source of power such as a battery **61**. Interposed in the circuit of the silicon-controlled switch **62** is a capacitor **63**. When a signal at the microphone **50** triggers the silicon-controlled switch **62**, the capacitor **63** will begin to charge. An emitter follower amplifier **64** is connected across the capacitor **63** and its output includes the meter **54** such that the voltage on the capacitor **63** will be reflected by the reading on the meter **54**. A microphone or vibration sensitive transducer **65** mounted on the rear side of the target detects when a ball hit from the tee collides with the target to trigger a second silicon-controlled switch **66** which, when conducting, shunts the silicon-controlled switch **62** and the capacitor **63** to preclude further charging of the capacitor **63**. The charge on the capacitor **63** at such a time will be related to the time it took the ball to travel from the point **52** on the platform **12** to the target **26**. Accordingly, the velocity of the ball has been measured and is, of course, related to the distance the ball would have traveled.

In order to reset the system, a timing circuit **67** utilizing a unijunction transistor **68** is arranged to energize a reed switch **70** when the unijunction transistor **68** fires after a predetermined time period has elapsed after the triggering of the silicon-controlled switch **66**. The energizing of the reed switch **70** will cause associated contacts **72** and **74** to temporarily close. The contacts **72** complete a shunting circuit to discharge the capacitor **63** while the contacts **74** shunt the silicon-controlled switch **66** thereby turning the latter off such that the next time the silicon-controlled switch **62** is triggered, the capacitor **63** will begin to charge anew. It will be apparent to those skilled in the art that the timing circuit **67** could be replaced with a manual reset switch. If desired, an off-on switch **76** may be provided to give master control over the entire circuit.

As mentioned in the preceding paragraph, the charge on the capacitor **63** is measured by the meter **54** and is a factor indicative of the distance a ball would have traveled had it not encountered the target **26**. Other factors to be considered include the initial elevation of the shot, nonlinearity in the charging of the capacitor **63** and the fact that the distance from the point **52** to various points on the target **26** varies as mentioned above.

With respect to nonlinearity in the charging of the capacitor **63**, this problem can be eliminated merely by incrementing the scale of the meter **54** in a nonlinear manner identical to the nonlinear charging curve of the capacitor **63** or by using a capacitor **63** with a sufficiently high value such that the time constant of the charging circuit is relatively large and only a very small portion of the capacitance is used thereby approximating linearity over a very small portion of the charging curve of the capacitor **63**. With respect to converting the voltage quantity across the capacitor **63** which is inversely proportional to velocity, into a distance quantity, the required integration may be performed by suitably incrementing the scale of the meter **54**. Similarly, the variation in distance from the point **52** on the platform **12** to the various points on the target **26** may be taken care of by providing a plurality of scales on the meter, one for each of the six elevation angle areas.

The construction of the target **26** will now be described and as seen in FIG. **4**, comprises a backing **80** formed of steel or other suitable materials. A layer **82** of an open celled foam is secured to the side of the steel backing **80** facing the tee platform **12**. Adhered to the foam layer **82** is a layer **84** of butyl rubber, which in turn, supports a second layer **86** of an open celled foam that is coated with a pressure sensitive adhesive. The coated foam layer **86** is covered with cloth **88** or the like. When the cloth is used, a strong jerseylike material is preferred because of the durability thereof.

It will be apparent from the foregoing description of the physical arrangement of the target **26** and tee **12** that a ball hit from the tee **12** towards the target **26** must rebound therefrom a sufficient distance such that spin may be determined. Furthermore, it will be apparent that such a rebound must be at a low velocity for two reasons, In the first place, if the ball rebounds at a high velocity, it is likely to strike a golfer and injure him. In the second place even though the ball may rebound at a sufficiently low velocity such that it will not injure a golfer if it strikes him, it may pass through the area **55** so quickly as to prevent the golfer from determining through which of the areas **55** the ball passed thereby precluding the golfer from determining the spin characteristic of the shot. The latter problem is partially obviated by the use of the ball-catching means **56** at the areas **55** such that a rebounding ball will be retained in the area through which it passes. However, even when the ball-catching means **56** are used, if the ball rebounds from the target **26** at too great a velocity, it may bounce over the ball-catching means **56** and the golfer will still not be able to determine the spin characteristic of the ball. Ac-

cordingly, it is desirable that the collision of a ball with the target **26** be sufficiently inelastic so as to preclude the ball from rebounding at a high velocity such that it might injure a golfer or preclude a determination of the spin characteristic but yet be sufficiently elastic so that the ball will at least return to the areas **55** such that the spin characteristic may be determined.

It has been found that an optimum ball rebound velocity is of a speed not unlike that, at most, of the initial velocity of a long putt. Such an optimum ball rebound velocity will cause a ball striking the target **26** to drop quickly to the ball return surfaces provided by either the base **22** or the putting platform **16** and substantially roll, as opposed to bounce, through the areas **55** to be caught by the ball-catching means **56**.

In an exemplary embodiment of the invention, such optimum ball rebound velocities may be obtained by forming the two foam layers **82** and **86** of an inherently resilient open celled polyurethane foam, the layer **82** being about 2 inches thick while the layer **86** is about one-quarter of an inch thick. The butyl rubber layer **84** may be about 1 inch thick and composed of any butyl rubber composition having a sufficiently high-hysteresis loss so that a collision of the golf ball and the target will be sufficiently inelastic such that the ball, whether driven by a wood or a high iron, will not rebound back towards the tee platform **12** at a velocity that could injure the golfer or preclude spin determination while additionally having a sufficiently low-hysteresis loss so that the collision will be sufficiently elastic to cause the ball to rebound at least a sufficient distance to reach the areas **55** on the tee platform to enable spin to be determined. A satisfactory composition for the butyl rubber layer **84** may be formed using a conventional mixing and forming method with the following components by weight:

TABLE I

Butyl 365*	100.0
MPC black	10.0
Stearic acid	3.0
Zinc oxide	5.0
Benzothiazyl disulfide	0.5
Tellurium diethyldithiocarbamate	0.5
Tetramethyl thiuram disulfide	1.0
Sulphur	2.0

*A trade name for a copolymer of isobutylene and isoprene manufactured by the Enjay Co.

In order to coat the foam layer **86** with a pressure-sensitive adhesive, it is only necessary to dip the foam layer **86** into a solution of a suitable pressure sensitive adhesive. After dipping, the excess adhesive is permitted to drain off and the foam is air dried for 24 hours.

A suitable pressure-sensitive adhesive may be selected from the formulations given in the following table.

TABLE II

	Formula 1	Formula 2	Formula 3	Formula 4
Vistanex L-80*	7.5%	3.4%	—	—
Vistanex LM/MH*	—	5.1%	20.0%	—
Vistanex LM/MS*	—	—	—	20.0%
Solvent (Toluene)	92.5%	91.5%	80.0%	80.0%

*Trademark—Enjay Co.

When the foam layer **86** is impregnated with a pressure-sensitive adhesive solution such as those described above, the collision of a ball therewith will cause compression of the foam layer at the point of impact thereby causing the cell walls of the foam to contact each other. The presence of the pressure-sensitive adhesive in the foam will cause the now abutting cell walls to stick together while the resiliency of the foam will tend to restore the foam to its normal, preimpact shape not withstanding the presence of the pressure-sensitive adhesive. Since the pressure-sensitive adhesive solutions are relatively weak, the restoring force caused by the inherent resiliency of the foam will gradually overcome the adhering force of the pressure-sensitive adhesive and after a short period of time, the foam layer **86** will be restored to its normal shape thus eliminating any evidence of an impact by a ball. For most purposes, formula 4 above offers the optimum restoration time which is in the neighborhood of 10 to 30 seconds. Formula 3 above provides a slightly longer restoration time. If for any reason it is desired to have an even longer restoration time, then a pressure-sensitive adhesive according to formulas 1 to 2 may be used.

It will be apparent to those skilled in the art that the above adhesive systems are based upon Vistanex (Trademark, Enjay, Co.) resins which are basically polyisobutylene polymers. Such polymer systems are particularly ideal because of the excellent aging characteristics thereof and their resistance to oxygen and ozone attack. However, in the event such characteristics are not required, it will be apparent that many other pressure-sensitive adhesive systems may be used in place thereof.

As mentioned previously, the exemplary form of the invention contemplates a 2 inch thickness for the layer **82** and a 1 inch thickness for the layer **84**. When the target is used as a target in a golf game, it has been found that thicknesses of the rubber layer **84** less than one-half inch may not absorb a sufficient amount of the kinetic energy of the ball to preclude a high-speed rebound. It has also been determined that when the foam layer **82** has a thickness of less than 1 inch, high-velocity golf shots (such as those hit by a driver) tend to cause the rubber layer **84** to "bottom out" through the foam layer **82** against the steel backing **80** thus increasing the elasticity of the collision of the golf ball thereby causing the golf ball to rebound at a velocity somewhat greater than is desirable. Similarly, if the foam layer **86** is too thick (as, for example, more than one-half inch), a golf ball will tend to become imbedded therein upon impact such that side spin thereon cannot be properly measured. Thus it will be apparent that when the target **26** is used in the golf game, the thickness of the layer **82** should be at least 1 inch and the thickness of the layer **84** should be at least one-half an inch. It should also be noted that it is desirable that the foams used in comprising the layers **82** and **86** are preferably of the open celled variety to preclude air compression in the cells thereof during the collision of a ball therewith from increasing the elasticity of the collision.

Turning now to FIGS. **6** and **7**, there is illustrated an exemplary form of a map for a golf hole and a plotting aid that may be used in actually playing a golf hole, from tee to green, using the structure described previously. The golf hole map is shown in FIG. **6** and comprises a sheet of transparent plastic **100**. Printed on the plastic sheet **100** in any suitable manner, are indicia illustrating various parts of a golf course hole **101**. For example, the fairway area of the golf hole **101** is designated **102** while the green is designated **104**. Sand traps are designated **106** while the rough is designated **108**. Trees are indicated at **110** and the tee of the hole is designated as a point **112** formed by the intersection of two lines. A reference line **114** which may be formed of one or more straight lines is drawn between the tee point **112** and the hole **116** which, of course, is located on the green **104**.

The plotting grid shown in FIG. **7** includes a point of origin **120** from which 11 lines **122** radially extend, Each of the lines **122** is given a reference numeral **124** from one to 11 and corresponds to the respective radial areas on the target **26**. The arrangement is such that the angle between each of the lines **122** is directly proportional to the angle between two lines drawn from the point **52** on the center of the mat **48** (FIG. **1**) to the center of adjacent areas formed by the vertical lines **53** on the face of the target **26**, the proportionality constant being determined by the illustrated width of the golf hole on the

plastic sheet **100**. Thus, if the golf hole on the plastic sheet **100** is drawn to scale, the proportionality constant will be unity and the angles will be equal.

The plotting grid additionally includes a plurality of concentric arcs **126** that have their center at the point of origin **120** and additionally intersect each of the lines **122**. Each of the arc lines **126** represents a distance from the point of origin and, in the exemplary embodiment, indicia **128**, representative of 50-yard increments are associated with each of the lines **126**.

The manner of using the golf hole map and the plotting grid to play a golf hole is as follows. Let us assume that the golfer intends to play his tee shot from the point **112** down the middle of the fairway **102** of the golf hole **101** as opposed to, say, cutting across the dog leg illustrated on the map of the golf hole **101**. The golfer will then tee up a ball at the point **52** and drive it into the target **26**. Let us assume the ball so driven impacted the target in radial area designated 4 and returned through the spin-detecting area **55** designated +1. In the manner described previously, the golfer will recognize that the ball would have come to rest in the radial area designated 5. Additionally, with the elevation information provided by the self-healing indentation on the target, a golfer may go to the appropriate scale on the meter **54** and read the yardage of his shot thereon. Let us assume that it was about 225 yards. The golfer will then place the plastic sheet **100** over the plotting grid with the point **112** being directly over the point **120**. Additionally, since the golfer had originally chosen to play the shot down the middle of the fairway **102**, he will align the line **124** designated 6 on the plotting grid with the reference line **114** on the golf hole **101**. He will then proceed out the line **124** designated 5 on the plotting board until he reaches a point approximately midway between the arc lines **126** designated 200 to 250. At this point, which is indicated **130** on the golf hole **101**, the golfer will make a mark such as an X with a waxed pencil or the like. The golfer has now completed his first shot.

In order to play the second shot on the hole for the golfer, the golfer will place the plastic sheet **100** over the plotting grid with the points **120** and **130** aligned. Additionally, if the golfer chooses to shoot directly for the hole **116**, he will arrange the plastic sheet **100** over the plotting grid such that the line **124** designated **6** will intersect both the point **130** and the hole **116**. The resulting arrangement will tell the golfer approximately the distance remaining to the hole **116** such that he may select a proper club. In the exemplary golf hole **101** illustrated in FIGS. **6** and **7**, the distance remaining is approximately 175 yards so the golfer may select a four or a five iron. He will then place the ball on a mat **48** that has a surface simulating the fairway on a golf course and hit the ball into the target **26**. After a check of the information provided by the target **26**, the meter **54** and the spin-detecting areas **55**, the golfer concludes, for example, that the ball would have traveled a distance of 150 yards and terminated in the radial area designated **4**. Using this information and the plotting grid, the golfer then plots the point at which the shot would have terminated on the golf hole **101**. In the example given, the point is indicated at **132** and it will be apparent that the golfer is just short of the green **104** and to the left of the hole **116**.

The golfer may then take a mat **48** to a point to the left of the green providing means and chip a shot towards one of the cups **42** or **44**. Once the ball is on the green-providing means **16**, the golfer may putt out in the usual manner.

Had the golfer's second shot terminated on the green **104**, he would have proceeded directly to the green providing means **16** and proceeded to putt in the usual manner. In order to determine the length of the putt, concentric circles (not shown) about the hole **116** may be used to divide the green **104** into a plurality of areas, each representing a known distance from the hole **116** and corresponding markers may be placed on the green providing means **16**. Alternatively, a separate plotting grid having a plurality of concentric areas may be used.

In the foregoing example, the plotting of the first shot was described as being accomplished by lining up the reference line **114** and the line **122** designated 6 on the plotting grid. However, if desired, any one of the lines **122** may be lined up on the reference line **114** or, for that matter, none at all. However, it is necessary that one of the lines **122** be aligned between the point of origin of the shot as marked on the hole **101** and some other portion or mark on the golf hole **101**. For example, if a golfer who is capable of hitting a so-called "long ball" is playing the game, he may feel that he is able to cut the corner of the dog leg shown in FIG. **6** and shoot directly for the hole **116**. Accordingly, the golfer will line up the point **112** and the point **120** and orient the plastic sheet **100** such that the line **124** designated 6 interconnects the point **112** and the hole **116** such that the golfer is aiming directly at the hole **116** from the tee. When this is done the golfer still need only direct his ball toward the center of the target **26** and will be able to plot his shot with reference to the center area of the target **26** and the centerline **124** of the plotting grid.

Of course, if the golfer strays into the rough **108**, a suitable mat **48** having bristles therein simulating the turf in the rough may be used in place of a fairway simulating mat. If a shot terminates in a sand trap **106**, an arbitrary penalty of one stroke may be assessed. For shots terminating in a water hazard, not shown, or out of bounds, the usual penalties may be assessed.

It will be apparent that a plurality of golfers may play a full 18 holes of golf using the game just described. Of course, in order to do such, it is necessary to provide at least 18 maps of golf holes **101**, all of which may differ in the usual respects. In order to keep track of the different golfer's shots, different colored waxed pencils may be used to make the appropriate marks or, if desired, each golfer may be provided with a map of each hole.

From the foregoing, it will be apparent that the invention provides a new and improved golf game that may be used in minimum space and which may be easily collapsed for storage or transportation. Additionally, those skilled in the art will appreciate that the arrangement of the various components of the game is such as to permit a golfer to work on every aspect of his golf game. The target construction provides an indication of the point of impact and heals in a short time period to prevent indications relative to previous shots from confusing the golfer. Finally, a golf game made according to the invention provides the golfer with all necessary information about a shot such that he can picture whether his shot would have been down the center of a fairway, in a fairway to the right or left of center, in the rough adjacent a fairway on either side thereof, or, in the case of shorter shots, whether the shot would have reached a green or was over, short or to the right or left of a green and to play simulated holes using the maps and plotting grid.

Having described an embodiment of our invention as required by 35 U.S.C. 112, we do not wish to be limited to precise construction set forth, but rather to have our invention construed according to the true spirit thereof as set forth in the following claims.

We claim:

1. A golf game comprising:
   a. an upright target adapted to receive a driven golf ball and including means for indicating the point of impact of a golf ball thereon;
   b. a tee spaced from said target from which a golf ball is adapted to be driven towards said target to impact thereon;
   c. spin detecting means spaced from said target for receiving a ball driven from said tee into said target and rebounding therefrom for determining the spin thereon; said target being sufficiently inelastic to preclude a high-speed rebound of the ball yet sufficiently elastic to rebound the ball at a low-velocity back to said spin detecting means;
   d. first indicia means on said target for indicating within a preselected range the directional bearings from said tee,

said first indicia means cooperating with said point of impact indicating means for indicating the initial direction of a golf ball driven from said tee; and

e. second indicia means associated with said spin detecting means for indicating an effect of spin on a ball driven from said tee, said first and second indicia means providing information and means for determining the direction from said tee in which the flight of a golf ball driven from said tee would theoretically have terminated had it not impacted against said target, and said first indicia means providing a visual reference for indicating within said preselected range of bearings the direction from the tee in which the flight of the ball would theoretically have terminated.

2. The golf game of claim 1 wherein said first indicia means comprise a plurality of zones on the face of the target each indicating a range of bearings from the tee and each bearing a first distinct identifying number; said spin detecting means comprises a plurality of spin indicating zones each indicating the direction and amount of side spin on a ball hit against the target and capable of receiving the rolling ball, and said second indicia means associated with said spin detection means comprise a plurality of second distinct numbers, one for each zone of said spin detecting means; and wherein the relationship of said first and second distinct numbers is such that the direction indicating zone on the face of said target representing the direction of theoretical termination of ball flight may be determined in cases where said terminal direction falls within the range of directional values of said first indicia means by adding the first distinct number corresponding to the direction indicating zone in which the ball impacted on said target to the second distinct number corresponding to the spin indicating zone of said spin detecting means in which the rebounding ball was received.

3. In a golf game, the combination comprising:

a. means defining a tee from which a golf ball may be driven;

b. means defining a target for intercepting balls hit from said tee;

c. means defining a ball return surface in front of said target for receiving golf balls rebounding from said target, and

d. spin indicating means associated with said ball return surface for receiving a ball rolling therealong and for providing an indication of the spin placed on the golf ball as it was driven from said tee, said target being generally upright and spaced from said tee and confronting said ball return surface, said target being formed of a material characterized by the ability to absorb most of the kinetic energy of a golf ball in flight striking the target and yet provide a collision sufficiently elastic to cause the golf ball to rebound from the target at a velocity sufficient to cause it to roll upon said return surface away from said target and to said spin indicating means, said tee including a predetermined tee point and said target including a nonplanar ball-intercepting surface resembling a section of an inverted cone and so configured that all points on said surface lying in a common horizontal plane passed through said surface are equidistant from said tee, and points lying in a higher plane are further from said tee than points lying in a lower plane.

4. The golf game of claim 3 wherein said ball return means comprises a substantially horizontal planar surface across which a ball can freely roll and said spin indicating means includes means positioned upon and extending across said ball return surface for catching and holding balls rebounding from said target.

5. The golf game of claim 4 wherein said target includes means for providing a self-healing visual indication of the initial elevational direction of the ball and the initial azimuthal direction of the ball.

6. A golf game comprising: means defining a tee from which a ball may be hit; an upright target spaced from said tee and including an energy absorbing surface presented to said tee; a horizontal planar ball receiving surface adjacent said energy absorbing surface and positioned to receive thereon balls rebounded by said energy absorbing surface; and spin indicating means associated with said ball receiving surface for detecting the nature and magnitude of spin on the balls rebounded by said target to said ball receiving surface and rolling thereacross, said energy absorbing surface being sufficiently resilient to receive golf balls hit thereagainst from said tee at a high velocity and rebound the balls at a velocity sufficient to cause said balls to roll across said horizontal planar ball receiving surface to said spin detecting means.

7. A golf game according to claim 6 further including distance determining means associated with said tee means and said target, said distance measuring means including means associated with the tee to acoustically detect the hitting of a ball from the tee and means associated with said target to sense the impact of the ball hit from the tee upon the target.

8. A golf game according to claim 6 wherein said ball receiving surface comprises a horizontal surface across which a ball can freely roll, and said spin indicating means includes means positioned upon and extending across said ball receiving surface for catching and holding balls rebounding from said target.

9. The golf game of claim 8 wherein said target includes means for providing a self-healing visual indication of the initial elevational direction of the ball and the initial azimuthal direction of the ball.

10. The golf game of claim 6 wherein said tee includes a predetermined tee point and said target includes a nonplanar, ball intercepting surface resembling a section of an inverted cone and so configured that all points on said surface lying in a common horizontal plane passed through said surface are equidistant from said predetermined tee point and points lying in a higher plane are further from said tee than points lying in a lower plane; means associated with said tee point for sensing when a ball is hit therefrom; means associated with said target for sensing when a ball impacts against the same; means associated with both of said sensing means for determining the distance a ball hit from said tee point will travel had it not struck said target; said target further including means for providing an indication of the initial direction of a golf ball driven from said tee comprising means for providing an indication of the initial elevational direction of the ball and the initial azimuthal direction of the ball.

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