

Aug. 11, 1970

W. D. CORNELL ET AL

3,523,689

GOLF GAME

Filed April 13, 1966

3 Sheets-Sheet 1

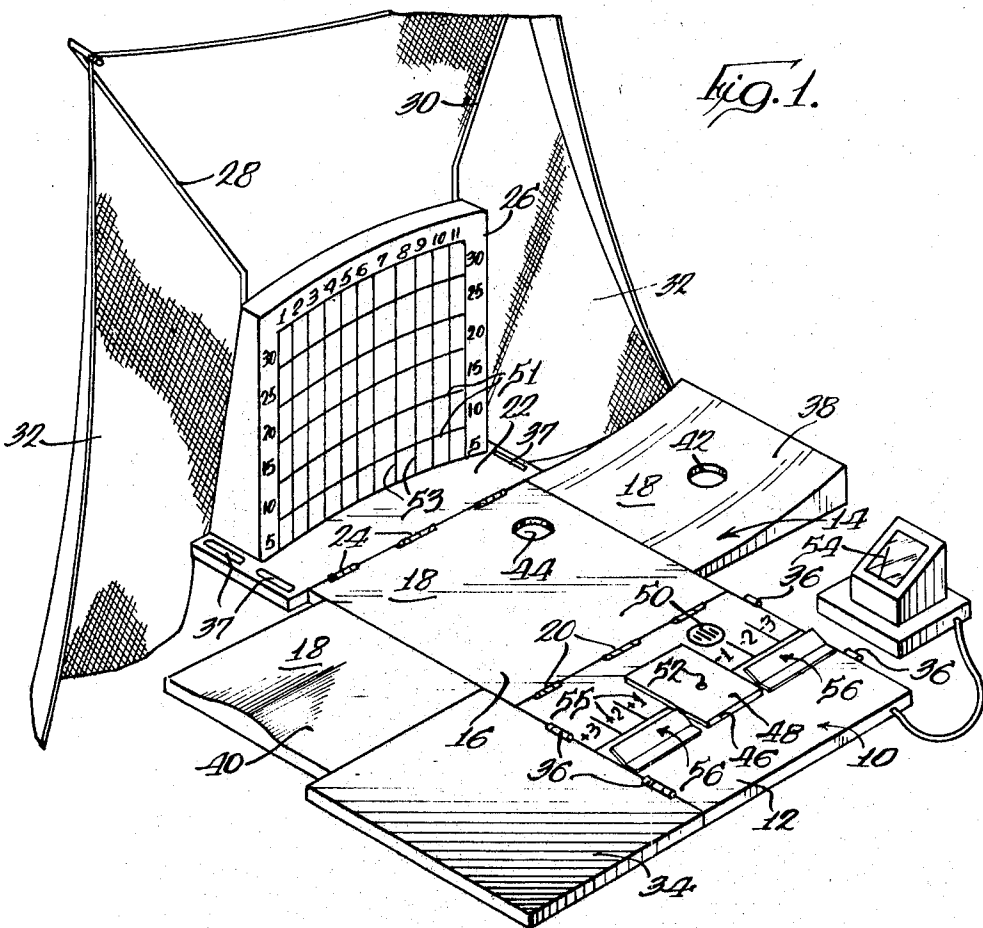


Fig. 1.

Fig. 2.

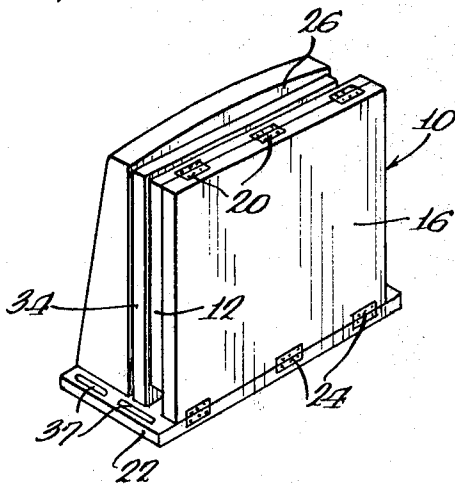


Fig. 8.

EXAMPLE	TARGET IMPACT ZONE	SPIN REBOUND ZONE	DIRECTION OF TERMINATION
1	1	+3(S)	4
2	8	-2(H)	6
3	5	-	5
4	4	-3(H)	1
5	8	+2(S)	10
6	7	-1(H)	6

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Fig. 1

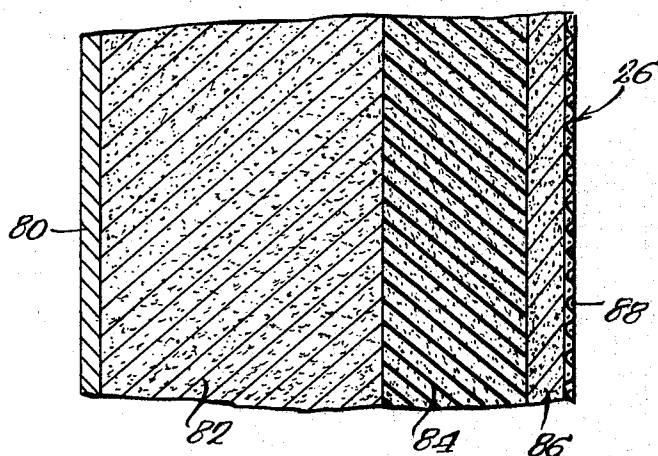
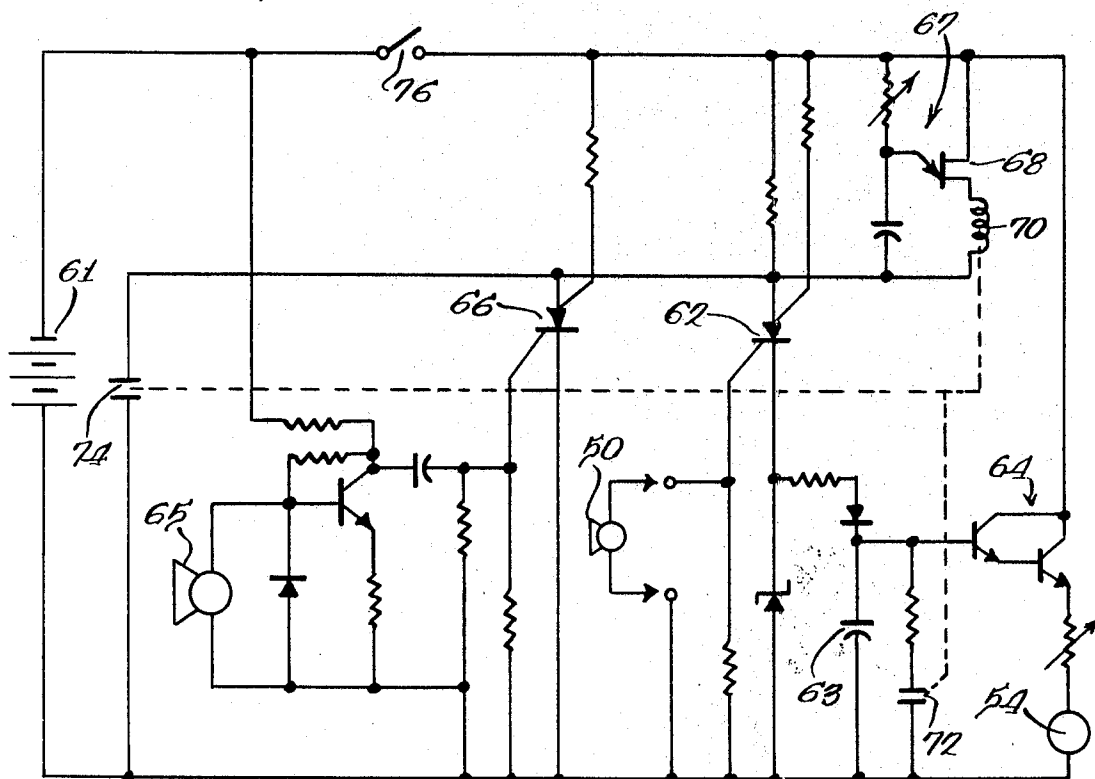


Fig. 3



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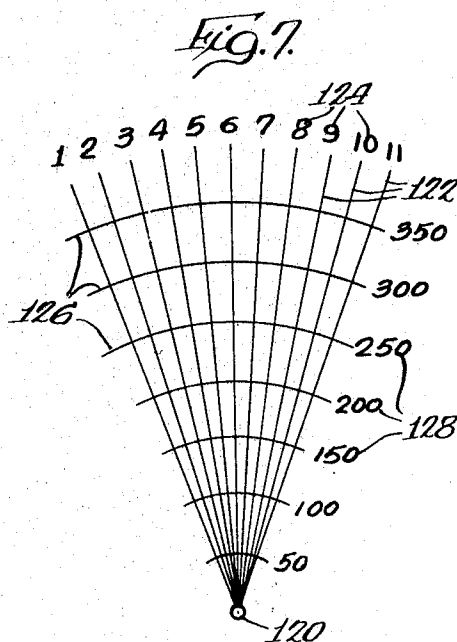
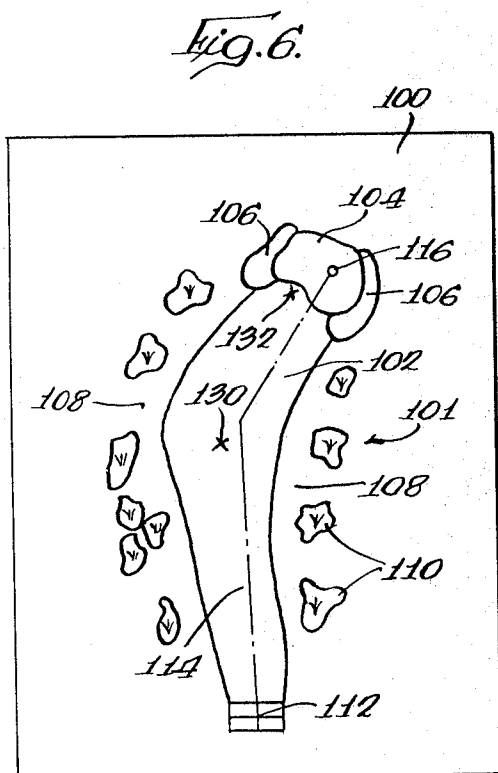
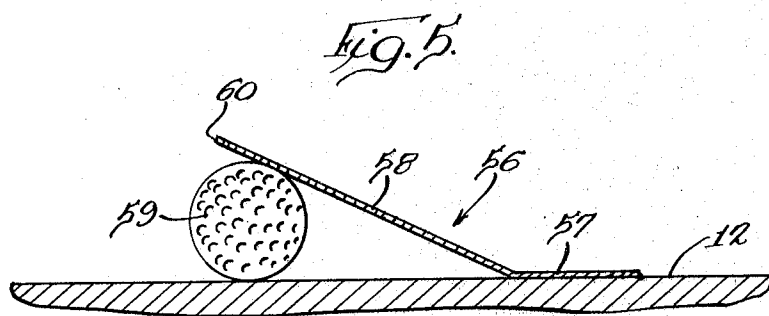
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3,523,689
GOLF GAME

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8 Claims

ABSTRACT OF THE DISCLOSURE

A target is positioned a short distance in front of the golf ball tee area. Foldable floor members connecting the target and tee area include a putting hole and thus serve as a putting green. The target and tee area are divided into zones identified by numerical indicia. By combining the numbers on the target and tee area, ball spin is determined. The target is provided with a foam layer impregnated with a pressure sensitive adhesive to temporarily record the point of ball impact. A determination is made of the distance the ball would have traveled had it not struck the target by measuring the ball's velocity in its travel to the target. This is accomplished by providing sensors at the tee area and target which control the extent to which a capacitor is charged. The target also includes a butyl rubber layer which prevents golf balls from rebounding back towards the tee area at a velocity that would injure the golfer or preclude spin determination. The golfer's accomplishments are plotted on a map of a golf hole by using a plotting grid.

BACKGROUND OF THE INVENTION

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

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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 hole from tee to green.

SUMMARY OF THE INVENTION

The principal object of the invention is 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, a map of a hole on a golf course and means for plotting on the map by use of the trajectory information, the point a shot would have terminated on the hole had the golfer actually been playing the hole.

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 material 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.

A still further object of the invention is the provision of a target being formed from a number of materials so as to provide a self-healing impact indicating mark together with optimum rebound characteristics.

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

DESCRIPTION OF THE DRAWINGS

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

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

FIG. 3 is a fragmentary vertical section of a target used in the golf game;

FIG. 4 is a schematic of a distance determining circuit;

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;

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

FIG. 8 is a table illustrating a manner in which certain trajectory information is combined in playing the game.

DETAILED DESCRIPTION

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' by 4' 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' by 4'. Accordingly, it will be apparent that a ball hit from the platform 12 toward the target 26 will travel a distance of about seven 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 "pop up" 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 two 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 plat-

form 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 the 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 degrees 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 brush-like 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 points 52.

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 eleven, 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 degree 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 degree elevation to the extreme left of center, had a spin thereon tending to make the ball slice and would have terminated at a point just to the right 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 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, non-linearity 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 T 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 jersey-like 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. Accordingly, 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.

I 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 two inches thick while the layer 86 is about one-quarter of an inch thick. The butyl rubber layer 84 may be about one 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 ¹	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

¹ 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 twenty four hours.

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

TABLE II

	Formula			
	1	2	3	4
Vistanex L-80,* percent	7.5	3.4		
Vistanex LM/MH,* percent		5.1	20.0	
Vistanex LM/MS,* percent				20.0
Solvent (Toluene), percent	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, pre-impact 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 opti-

mum restoration time which is in the neighborhood of ten to thirty 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 or 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 two inch thickness for the layer 82 and a one 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 one 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 therein 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 one 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 eleven lines 122 radially extend. Each of the lines 122 is given a reference numeral 124 from one to eleven 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 fifty-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. Other examples of correlating the target impact zones and the spin rebound zones to determine the direction of termination are shown in the table illustrated in FIG. 8. It is to be noted that the letters "S" and "H" in the column headed "Spin Rebound Zone" indicate that the golfer has sliced or hooked a shot, respectively, assuming that the golfer is right handed; and that the designation of a hyphen (-) in Example 3 indicates that the golfer has not imparted side spin to the ball. 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 122 designated 6 on the plotting grid with the reference line 114 on the golf hole 101. He will then proceed out the line 122 designated 5 on the plotting board until he reaches a point approximately midway between the arc lines 126 designated 200 and 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 122 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 pro-

viding 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 122 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 center line 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 stand 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 eighteen holes of golf using the game just described. Of course, in order to do such, it is necessary to provide at least eighteen 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 a 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: tee means from which a golf ball is adapted to be hit; ball stopping means spaced from said tee means for stopping a ball hit from said tee means; means providing a putting area interposed between said tee means and said ball stopping means;

means for providing information relative to the trajectory a ball hit from said tee means would have taken had it not struck said ball stopping means; means providing a map of a hole on a golf course; and a manually operable plotting instrument for plotting on said map the point on said map means where a shot would have terminated had a golfer actually been playing said hole by using information provided by said trajectory information providing means whereby a golfer may hit a plurality of successive shots from said tee means and plot the point of theoretical termination of each shot on said map providing means and play a simulated golf hole using said tee means and said putting area means; said trajectory providing means comprising first means for determining the theoretical distance a shot would have traveled; second means for providing information with regard to the initial direction of the shot and third means for providing information relative to the spin of the shot; a first set of numerical indicia associated with said second means, a second set of numerical indicia operatively associated with said third means; said second and third means and said first and second sets of numerical indicia being arranged with respect to each other such that the theoretical point of termination of a shot with respect to the azimuth is determined by the algebraic sum of a number from said first set of indicia representative of the initial direction of a shot and a number from said second set of indicia representative of spin on said shot.

2. A golf game according to claim 1 wherein said second means comprises a plurality of first zones and said first set of numerical indicia comprises a plurality of numbers, one for each zone, arranged in sequence; said third means comprising a plurality of second zones and said second set of indicia comprising two series of numbers equaling in number to the number of said second zones with each series in sequence, one series being positive and the other being negative.

3. A golf game according to claim 2 wherein said series are located on opposite sides of said tee.

4. A method of playing a simulated golf hole on a golf device providing first numerical information indicative of the distance a free flying golf ball hit from a tee will travel, second numerical information relative to the initial direction the free flying ball hit from the tee will travel, and third numerical information relative to the effect on the final direction from the tee of a shot due to hook or slice spin with the use of a map of the golf hole, comprising the steps of:

- (a) hitting a free flying golf ball from the tee with a golf club;
- (b) observing the first information, second information and third information provided by said device;
- (c) plotting on said map from a theoretical point of initiation of the shot, the theoretical point of termination of the shot as determined by said first, second and third information; and
- (d) marking the point of theoretical termination so determined on the map whereby it may serve as the theoretical point of initiation of a second shot.

5. A method of playing a simulated golf hole according to claim 4 wherein said step of observing is followed by, and said step of plotting is preceded by the step of combining said second and third information to arrive at the direction of theoretical termination of the shot.

6. A golf game comprising: tee means from which a golf ball is adapted to be hit; upright ball stopping means spaced from said tee means for stopping a ball hit from said tee means and operable to rebound a ball toward said tee means at a low velocity; means providing a combination putting surface and ball rebound surface interposed between said tee means and said ball stopping means; means for providing information relative to the trajectory a ball hit from said tee means would have taken had it not struck said ball stopping means including means for computing and indicating the distance the ball would

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have traveled, means for indicating the initial direction of a ball hit from said tee means, means spaced from said ball stopping means and cooperating with said combination putting area and ball rebound surface to receive a ball rebounded by said ball stopping means for indicating the nature and degree of side spin on a ball hit from said tee means, said initial direction indicating means and said side spin indicating means being constructed and arranged to cooperate with each other so that a golfer may ascertain the direction of the point of termination of the flight of a ball hit from said tee means; means providing a map of a hole on a golf course; and a manually operable plotting instrument for plotting on said map the point on said map where a shot would have terminated had the golfer actually been playing the golf hole depicted thereby by using the information provided by said trajectory information providing means so that a golfer may hit a plurality of successive shots from said tee means and plot the point of theoretical termination of each shot on said map and thereby play a simulated golf hole from tee to green using said tee means and said putting area means.

7. A golf game according to claim 6 wherein said ball stopping means comprises an upright target; said initial direction indicating means includes means defining a plurality of first zones on said target and a first set of numerical indicia associated with said first zones to identify the same; and said side spin indicating means includes means defining a plurality of second zones to which a ball striking said target may be rebounded and a second set of numerical indicia associated with said second zones, said first and second indicia being correlated with each other so that algebraic combination of the numerical indicia

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associated with the first zone representing the initial direction of the ball and the second zone indicating the nature and degree of side spin of the ball will result in a number corresponding to the first zone representing the direction of the point of terminating of the shot.

8. A golf game according to claim 7 wherein said plotting instrument includes point of origin defining means, a plurality of radially extending line means emanating therefrom and defining a plurality of third zones corresponding to said first zones, third numerical indicia means corresponding to said first numerical indicia means associated with said third zones and a plurality of distance indicia means arcuately arranged about said point of origin means.

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