Dec. 17, 1963 F. A. HURLEY 3,114,555

GOLF GAME APPARATUS

Filed Nov. 21, 1961 7 Sheets-Sheet 1

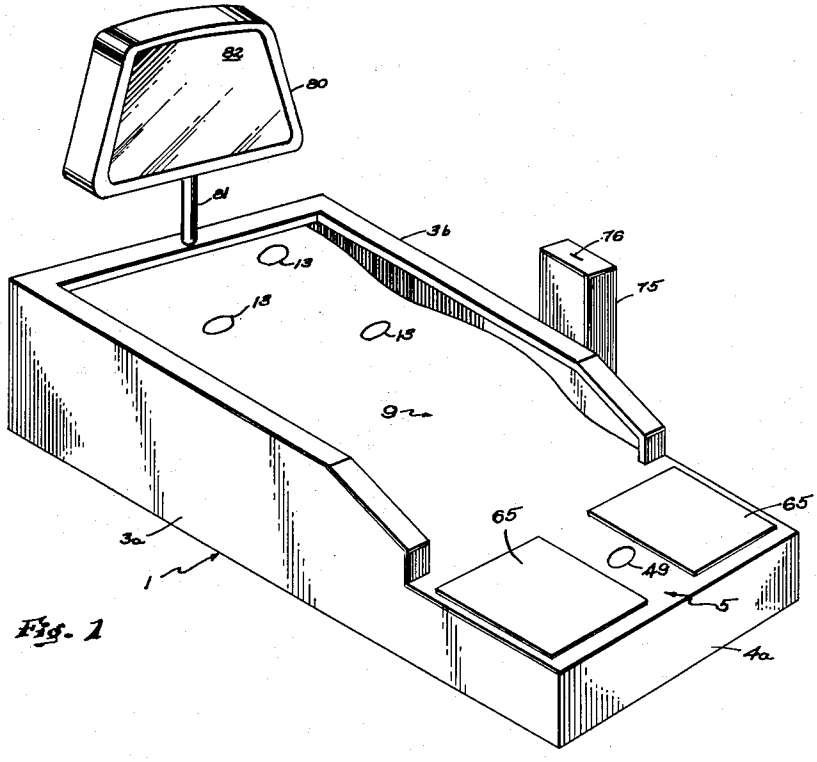


Fig. 1

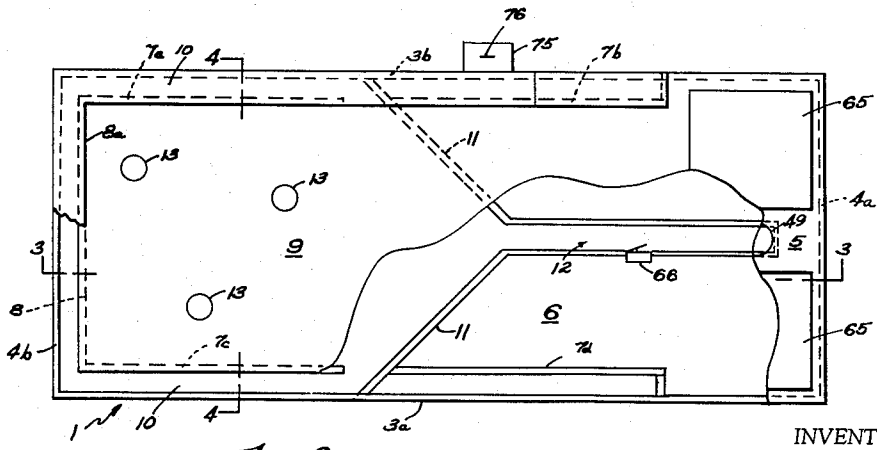


Fig. 2

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GOLF GAME APPARATUS

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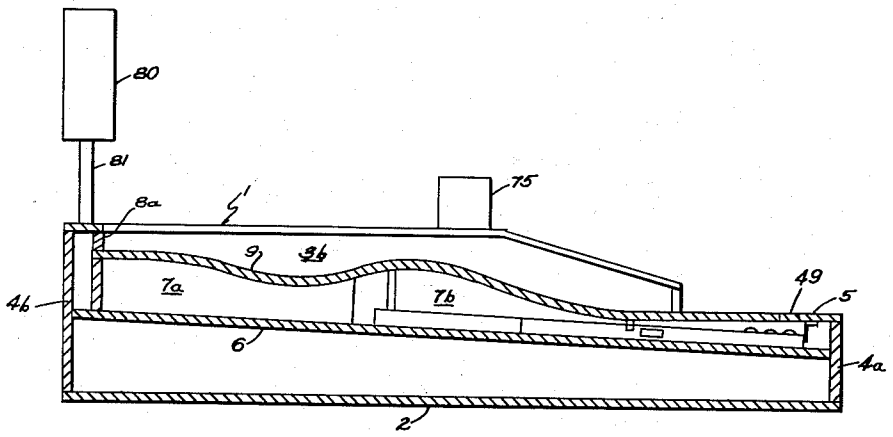


Fig. 3

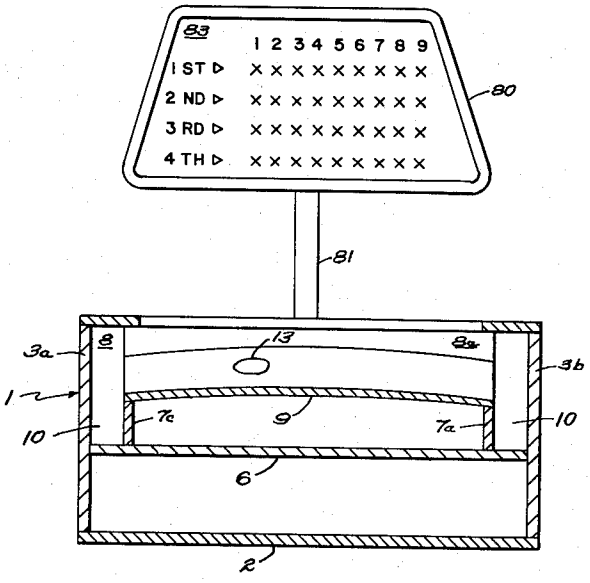


Fig. 4

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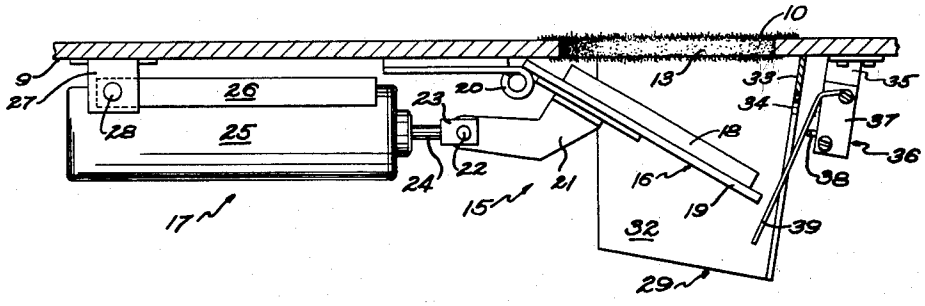
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GOLF GAME APPARATUS

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Fig. 5



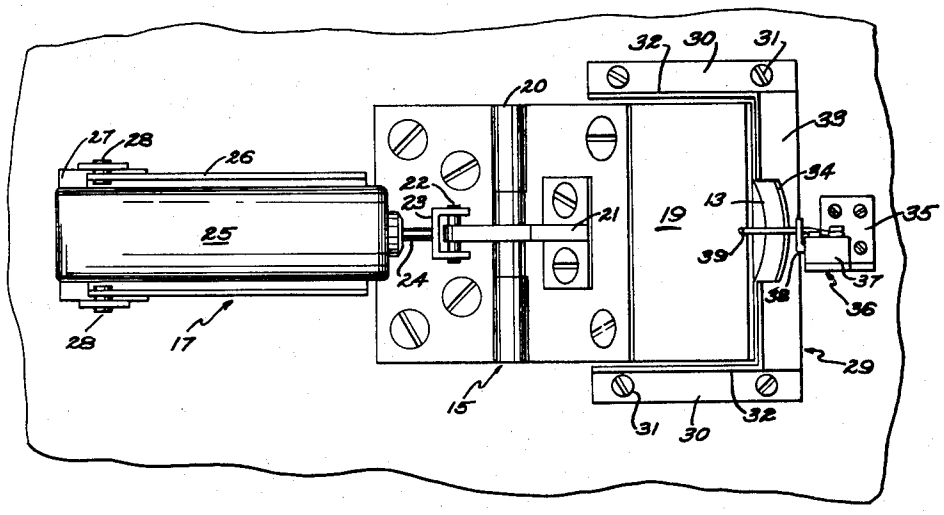


Fig. 6

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GOLF GAME APPARATUS

Filed Nov. 21, 1961 7 Sheets-Sheet 4

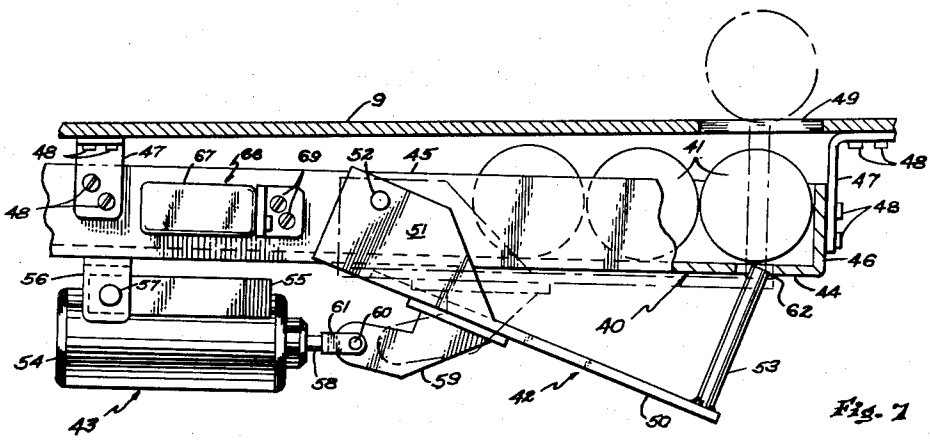


Fig. 7

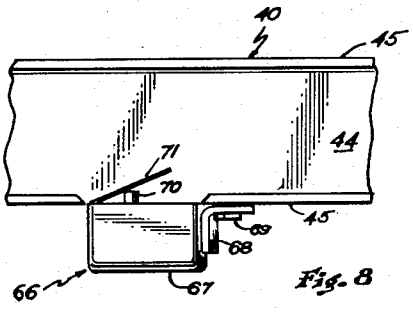


Fig. 8

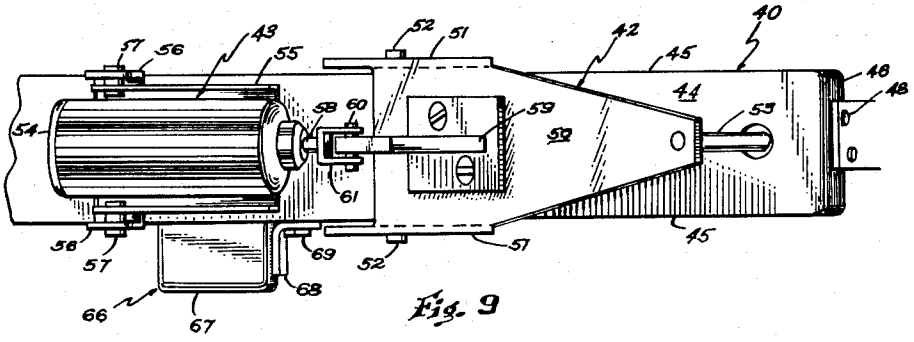


Fig. 9

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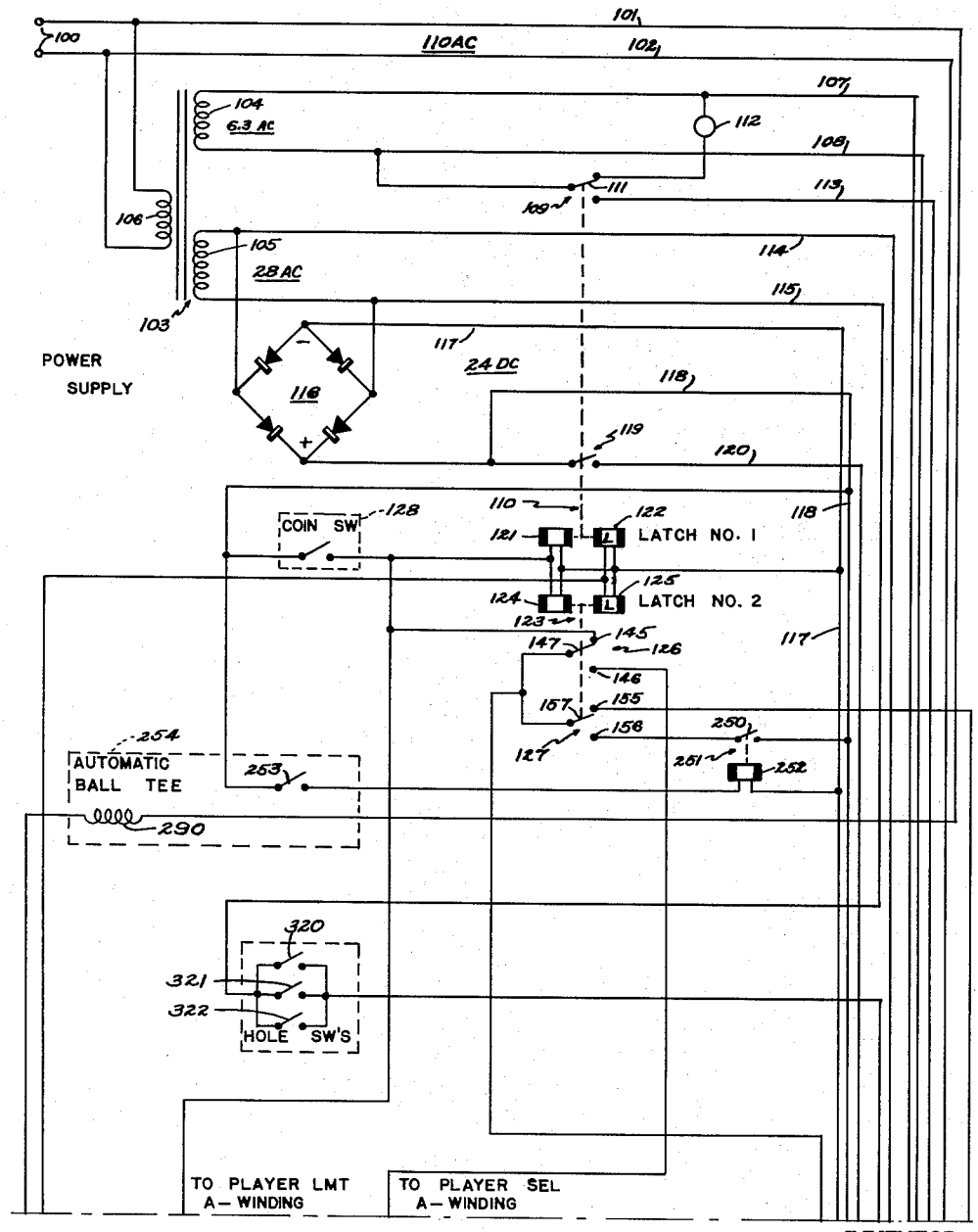


Fig. 10

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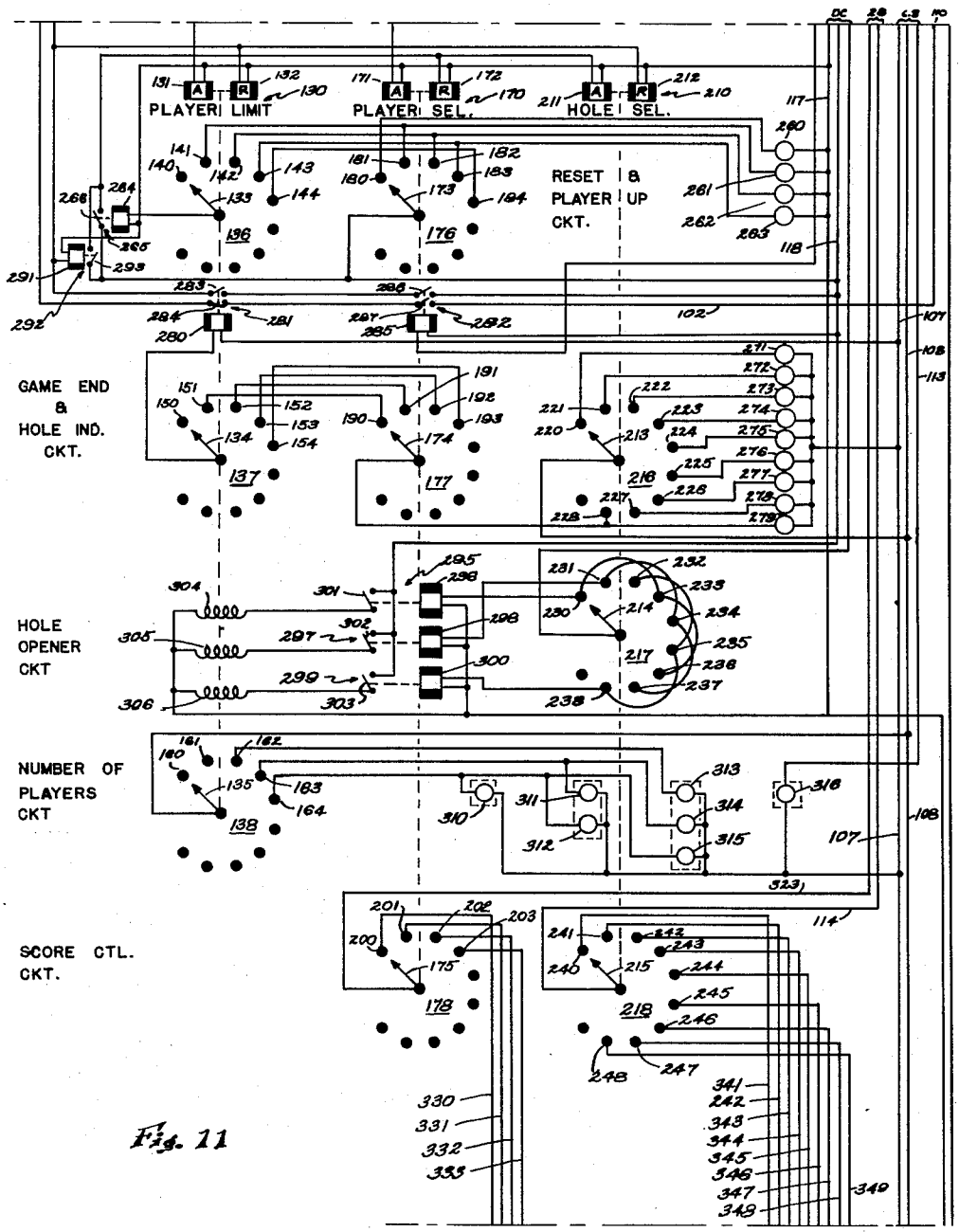


Fig. 11

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GOLF GAME APPARATUS

Filed Nov. 21, 1961 7 Sheets-Sheet 7

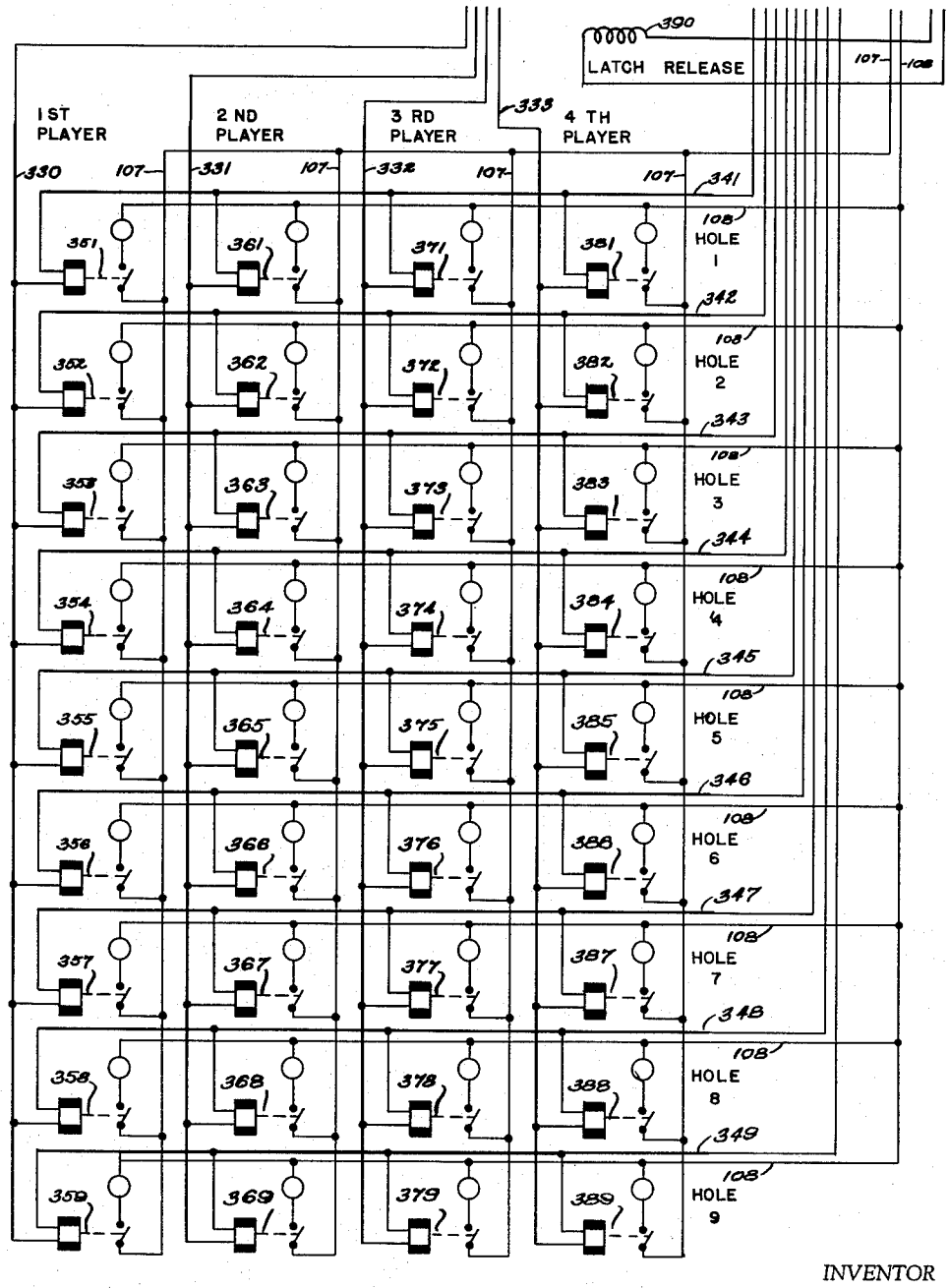


Fig. 12

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United States Patent Office 3,114,555 Patented Dec. 17, 1963

3,114,555

GOLF GAME APPARATUS

Frederick A. Hurley, Miami, Fla., assignor to Forward Industries, Inc., a corporation of Florida

Filed Nov. 21, 1961, Ser. No. 153,944
10 Claims. (Cl. 273—176)

This invention relates to game apparatus and more particularly to a relatively compact game apparatus which makes it possible to closely simulate the actual game of golf.

Because of the widespread interest in golf, numerous types of game apparatus, usually intended for indoor use, have been proposed which enable the player or players to simulate the actual game of golf to some degree. In most cases, such apparatus have provided only a single hole and, even though sometimes embodying scoring features and the like, have offered the player little more than the opportunity to demonstrate his skill in putting. In some few instances, game apparatus heretofore proposed have provided more than one hole. In those cases, however, the plurality of open holes, necessarily positioned close together because of the limited extent of the playing surface, have done little to improve similarity of the game to actual golf as played on the links and have presented the player with the almost impossible task of avoiding two or more holes when attempting to sink a putt in another hole.

A general object of this invention is to provide a relatively compact game apparatus, capable of being installed indoors, which allows players to use a conventional golf club, if desired, and a conventional golf ball to play a competitive game which simulates a game of golf as actually played on full size outdoor links.

Another object is to provide such a game apparatus embodying a plurality of holes, spaced at various points on a playing surface, but so constructed and arranged that only one of the holes is presented in open condition for play at any given time during the game.

A further object is to provide a game apparatus of the type described which is adapted to be activated for play by a single control device, such as a coin-operated switch, and which operates automatically, once activated, to keep and display accurate scores for all of the players involved.

In my copending application Serial No. 153,943, filed concurrently herewith, a golf game apparatus is described having nine holes suitably spaced from one another on a playing surface, these holes being spaced from one end of the playing surface hereinafter referred to as the "teeing area." Each of the holes is equipped with a closure device which is normally in the hole-closing position. The closure devices are actuated by electrical control circuits and, upon deposit of a coin in a suitable coin switch unit, the first hole is opened. Each of the players then has an opportunity to play the first hole, taking as many strokes as are required to pass a golf ball through the open hole. The strokes taken by a player are detected and registered, providing each player a separate score accordingly. After each of the players has completed the first hole, the first hole is closed, the second hole is opened automatically, and the game continues with each player in turn playing the second hole. The game continues in this fashion with the remaining holes being opened sequentially until all nine holes are played.

Another object of this invention is to provide a more compact and less expensive golf game apparatus which still provides the basic advantages of the game apparatus described in said copending application.

Yet another object is to provide a golf game apparatus employing less than nine playing holes actuated in a sequence to simulate a nine hole golf game.

Still another object is to provide game apparatus of

the type described which permits a simulated golf game to be played in a relatively short period of time by limiting each player to one stroke per hole. An additional feature associated with such a single stroke game is realized when a unique scoring matrix unit in accordance with this invention is employed to greatly simplify the required scoring mechanism.

A still further object is to provide an automatic ball teeing device in combination with a game control apparatus which detects when the play of a ball has been completed to automatically "tee up" another golf ball, and to advance the control apparatus to open the next successive hole when appropriate, and to properly score the next ball played.

In order that the manner in which these and other objects are attained in accordance with the invention can be understood in detail, reference is had to the accompanying drawings, which form a part of this specification, and wherein:

FIG. 1 is a perspective view of a golf game apparatus constructed in accordance with one advantageous embodiment of the invention;

FIG. 2 is a top plan view of the apparatus of FIG. 1, with some parts broken away for clarity of illustration;

FIGS. 3 and 4 are sectional views taken on lines 3—3 and 4—4, FIG. 2, respectively;

FIGS. 5 and 6 are side elevational and bottom plan views, respectively, of one of the hole closure devices employed in the apparatus of FIG. 1;

FIG. 7 is a side elevational view of an automatic ball teeing device employed in the apparatus of FIG. 1;

FIG. 8 is a sectional view of a portion of the automatic ball teeing device taken on line 8—8, FIG. 7;

FIG. 9 is a bottom plan view of the automatic ball teeing device when removed from the game apparatus; and

FIGS. 10–12 are interrelated schematic diagrams illustrating in detail the electrical control system employed in the apparatus of FIG. 1.

Stated in general terms, the game apparatus of the present invention includes a playing surface having three holes suitably spaced from one end of the playing surface, which end is referred to as the "teeing area." Each of the holes is equipped with a closure device comprising a movable closure member normally disposed within the hole and effective to completely close the hole in such manner that the playing surface is effectively continuous as long as the closure member is in its normal position. Each closure device also includes an actuator which can be operated to move the closure device to an open position which will allow golf balls to pass through the hole. As the game is played, the closure devices are opened in the sequence 1, 2, 3, 1, 2, 3, 1, 2, 3. With such a sequence, there are nine separate sequential hole openings to simulate the nine holes of a normal golf game. While three holes have been selected for this particular embodiment of the invention, it is obvious, however, that any number of holes nine or less could be employed with any desired sequence of hole openings.

An electrical control system operatively connected to the actuators of the closure devices is advantageously activated by a single control device such as a coin operated switch. The number of coins deposited is registered and indicates the number of players using the game. The first coin deposited automatically opens the first hole and actuates an automatic ball teeing device to properly position a golf ball in the "teeing area." The first player is then permitted one stroke and, if successful, will cause the golf ball to pass through the open hole and, if unsuccessful, causes the ball to go off the end or the sides of the playing surface into a ball return device. If the first player is successful, an appropriate illuminated indica-

tion is provided indicating that the first player has successfully completed the first hole. In either event, i.e., whether the ball passes through the hole or into the ball return device, the ball is returned by gravity to the automatic teeing device.

The return of the ball to the automatic teeing device is detected and automatically causes a second ball to be positioned in the teeing area, permitting the second player to play the first hole. When the number of balls positioned in the teeing area equals one more than the number of coins deposited, the first hole is closed and the second hole is opened automatically at the same time that the next ball is positioned in the teeing area. The game is then played in this fashion with each player being given an opportunity to play each of the holes, and when a player is successful in passing a golf ball through the open hole, an appropriate illuminated indication is rendered. When a sufficient number of balls has been provided, the automatic teeing device is automatically made inoperative and, subsequently, when the last ball is returned to the automatic teeing device, the control system is reset for a new game.

Referring to the drawings, FIGS. 1–4 illustrate an embodiment of this invention which comprises a generally horizontally extending frame 1 having a bottom wall 2, spaced upright side walls 3*a* and 3*b*, and upright end walls 4*a* and 4*b*. For convenience of reference, end wall 4*b* will be referred to as the back of frame 1. Toward the front of the frame, the side walls 3*a* and 3*b* stop short of the end wall 4*a* so that an area 5 is left free to define a teeing area.

Disposed above the bottom wall 2, and having all of its edges securely attached in any suitable fashion to side walls 3*a* and 3*b* and end walls 4*a* and 4*b*, respectively, is a forwardly and downwardly slanting ball return partition 6. In addition to serving as an inclined support along which balls may roll toward end wall 4*a*, partition 6 also mounts five framing members which extend respectively parallel to the two side walls 3*a* and 3*b* and the end wall 4*b* but are spaced inwardly therefrom Thus, the two members 7*a* and 7*b* are each parallel to side walls 3*b*, the two members 7*c* and 7*d* are each parallel to side wall 3*a*, and the member 8 is parallel to end wall 4*b*. The framing members 7*a*–7*d* and 8 and end wall 4*a* support a contoured sheet 9, which can be of plywood or any other suitable sheet material, of such shape as to define the playing surface of the game apparatus. The upper surface of contoured sheet 9 is covered with a sheet of material suitable for simulating a putting green such as a sheet of felt, pile fabric or the like. The sheet 9 can be characterized as having an undulating configuration. Thus, as viewed from the front of the apparatus, the sheet 9 first rises from the teeing area 5, then slants downwardly and then again rises toward the top of member 8. As shown in FIG. 4, the portion of sheet 9 between the two rises is bowed to be somewhat higher in the center. A member 8*a* is positioned at the end of sheet 9 to prevent golf balls from travelling off the back end of the contoured sheet. Accordingly, once a ball has been storked along the playing surface from the teeing area with sufficient force to climb the initial rise, it must gravitate to one side or the other of the apparatus, assuming it does not pass through one of the holes hereinafter described.

Framing members 7*a* and 7*c* coact with the upper surface of partition 6 and with side walls 3*a* and 3*b* to define forwardly extending and downwardly slanting ball return gutters 10. These gutters are terminated by a pair of inwardly directed deflecting members 11 which are mounted on return partition 6. The deflecting partitions are disposed in the path of balls rolling down the gutters toward the forward end of the apparatus, so that these balls are deflected toward the center of the apparatus into the automatic teeing device 12, hereinafter described.

In the area between back wall 4*b* and the first raised portion of the contoured sheet, as viewed from the front of the apparatus, sheet 9 is provided with three circular openings 13 which serve as holes to which the golf balls are directed by players. As illustrated, the holes 13 are spaced apart over the playing surface. Considering the contour of the playing surface as established by sheet 9, and the spaced positions of the holes 13, it is apparent that the problem of sinking a putt from the teeing area through any one of the three holes is distinctly different.

When a golf ball passes through any one of the holes 13, it drops onto the partition 6 in the area bounded by framing members 7*a*, 7*c* and 8 and the deflecting members 11. Balls which have dropped through the holes roll down partition 6 toward the front of the apparatus, and are deflected by deflecting members 11 into the ball teeing device 12.

The closure device employed is illustrated in FIGS. 5 and 6 and is indicated generally at 15. Such a closure device is provided for each of the holes 13 and comprises a hinged closure member 16 and a solenoid actuator 17. Closure member 16 comprises a circular main body portion 18 having a diameter such that the closure member can close the hole 13 with which it is associated simply by having the body 18 completely fill the hole. Body 18 is carried by a flat plate 19 secured to one leaf of a conventional double leaf hinge 20. The other leaf of hinge 20 is rigidly attached to the lower surface of sheet 9, properly positioned adjacent hole 13 so that, when plate 19 swings upwardly into contact with the lower surface of sheet 9, circular body 18 comes into precise registration with and effectively completely fills the hole 13.

Also secured to the same leaf of hinge 20 which carries the closure member is a force-transmitting arm 21. As will be clear from FIG. 5, the arm 21 depends from closure member 16 and it will be understood that the arm lies at least generally in a plane which includes a diameter of the hole 13 and is disposed at right angles to the axis of the pivot pin of hinge 20. At its free end, arm 21 carries a pivot pin 22 journaled in the bifurcated end portion 23 of shaft 24 of the solenoid actuator 17. Pivot pin 22 extends parallel to the pivot pin of hinge 20.

Actuator 17 comprises a fully encased, spring biased solenoid assembly 25 which is of cylindrical form and rigidly carried by a channel-shaped frame member 26. The longitudinal axis of assembly 25 lies in the plane of the force-transmitting arm 21. At the end of the solenoid assembly opposite arm 21, frame member 26 is pivoted to a mounting bracket 27 by means of transversely aligned pivot pins 28. Solenoid assembly 25 is spring biased to force shaft 24 outwardly, the shaft being drawn inwardly (to the left, as viewed in FIGS. 5 and 6) upon energization of the solenoid. When the solenoid is deenergized, the spring force is adequate to move shaft 24 through a distance which causes plate 19 to pivot upwardly into engagement with sheet 9, body 18 therefore closing hole 13. Upon energization of the solenoid shaft 24 is actuated through a distance which causes plate 19 to pivot downwardly to such an extent that a golf ball can escape between sheet 9 and the lowermost portion of body 18.

Depending from sheet 9, and terminating below the lowermost operative position of body 18, is a ball guiding shield 29. Formed of at least relatively stiff sheet material, shield 29 has outwardly projecting top flanges 30 on opposite sides of opening 13 and secured to sheet 9 in any suitable manner, as by screws 31. In the form illustrated, shield 29 is of U-shaped transverse cross section, having side walls 32 and a wall 33 which faces the teeing area. Wall 33 is provided with an exit opening 34 of such size as to allow free passage of a golf ball. Accordingly, when the solenoid is energized to pivot closure 16 downwardly, so that hole 13 is open, a golf ball dropping through the hole will roll down member 18 and, guided by shield 29, will escape via opening 34 so as to drop onto partition 6.

Mounted on sheet 9 by bracket 35 in such fashion as to be located outside of shield 29 near exit opening 34 is a ball detector switch 36. Switch 36 is of conventional type, including switch housing 37 and actuating plunger 38, for example, and comprises a resilient feeler 39. The feeler slants downwardly through opening 34 into the space within shield 29, in such fashion that a golf ball rolling through opening 34 must engage the feeler and displace the same in a direction and to an extent such as to depress plunger 38 and actuate the switch. Hence, any ball which drops through opening 13 and exits through opening 34 is caused to move feeler 39 and thereby actuate switch 36. The automatic ball teeing device 12 is shown in FIGS. 7–9 and includes a ball runway 40 in which golf balls 41 come to rest, a pivotal pusher unit 42 and a solenoid actuator 43. When solenoid 43 is energized, the pusher pivots and pushes one of the golf balls 41 from the runway onto the playing surface.

The ball runway 40 is bounded by a bottom wall 44, spaced apart side walls 45 and an end wall 46. The spacing between side walls 45 is slightly more than the diameter of a golf ball. The ball runway is secured to the lower surface of sheet 9 in any suitable fashion, as by brackets 47 and screws 48, as shown. The ball runway is slanted downwardly toward end 46 so that balls 41 will roll therealong by gravity and come to rest against end wall 46. Aperture 49 is centered in the teeing area 5 of sheet 9 and has a diameter sufficient to permit a golf ball to pass through. The ball runway is so positioned with respect to hole 49 that the golf ball resting against end wall 46 is centered beneath aperture 49.

Pivotal pusher unit 42 comprises a flat bottom plate 50 tapered toward one end, and a pair of integrally connected, upwardly extending side members 51. The spacing between side members 51 is slightly greater than the width of the ball runway so that pusher unit 42 can be pivotally mounted on the runway by any suitable means such as pivot pins 52 extending from the side walls of the ball runway. A pusher pin 53 is welded to bottom plate 50 near the tapered free end thereof and extends therefrom perpendicularly. Actuator 43 comprises a fully encased, spring biased solenoid assembly 54 of cylindrical form rigidly carried by a channel-shaped frame member 55. Channel member 55, at one end, is pivotally mounted on a U-shaped bracket 56 by means of transversely aligned pivot pins 57. Bracket 56 is fixed to the bottom wall of the ball runway 40, by any suitable means, and depends from the runway. Plunger 58 of solenoid assembly 54 is spring biased to the retracted position so that, upon energization of the solenoid winding, the plunger will project, i.e., move toward the right as viewed in FIGS. 7 and 9.

A force transmitting arm 59 is secured to the bottom member 50 of the pusher member and lies generally in a plane passing through the longitudinal axes of both the ball runway 40 and solenoid 54, and is disposed at right angles to the axis of pivot pins 52. At its free end, arm 59 carries a pivot pin 60 journalled in the bifurcated end portion 61 of plunger 58. When plunger 58 is in its normal retracted position, as shown in FIG. 7, the pusher unit 42 is in its lowermost position, as shown, and pusher pin 53 rests in an aperture 62 located in bottom member wall 44 and centered beneath aperture 49. When solenoid 54 is energized, plunger 58 projects, pivoting pusher unit 42 to its uppermost position, shown in broken lines, in which position bottom plate 50 is parallel to bottom wall 44. As pusher unit 42 pivots from its lowermost position to its uppermost position, pusher pin 53 will engage the ball resting against end wall 46 and raise this ball through aperture 49 to the position shown in broken lines.

The aperture 49 through which the golf ball passes is positioned, as shown in FIG. 1, in the center of teeing area 5. The teeing apparatus is centered on aperture 49

and extends longitudinally toward the rear of the apparatus, as seen more clearly in FIG. 2. A player using the game apparatus will normally position himself on either one of the rubber mats 65 adjacent aperture 49. Therefore, when pusher pin 53 projects a golf ball through the aperture 49, this ball comes to rest in proper teeing position and can then be stroked by the player along the playing surface.

When a ball returns to ball runway 40, passage of the ball is detected by means of the switch unit 66. This unit comprises an electric switch 67, secured to side wall 45 by any suitable means such as bracket 68 and screw 69. Switch 67 is actuated to the electrical circuit closed position when pin 70 is depressed. A flexible feeler member 71 is secured to the end of switch 67 opposite bracket 68, and projects, through a suitable opening in the respective side wall 45, into the ball runway. As a ball passes down the ball runway 40, feeler member 71 is pressed toward switch 67, depressing pin 70 and actuating switch 67 to the closed position.

Mounted adjacent side wall 3*b*, as shown in FIGS. 1–3, is an upright housing 75 provided at its top with a coin slot 76. A conventional coin operated switch unit is mounted within the housing and is moved to the circuit closing position momentarily each time a coin is deposited through slot 76.

A housing 80 containing the scoring means is mounted at a convenient viewing location above the rear of the apparatus. The housing may be of any desirable configuration and is advantageously glass-fronted. The housing is secured to the apparatus by means of a tubular post 81, the post being secured to the top of frame 1 and to housing 80 by any suitable means.

Behind the glass front plate 82, as shown in FIG. 1, is an opaque plate 83 with translucent areas represented by the figures shown in FIG. 4, i.e., the translucent areas are the indicia "1st," "2nd," "3rd," "4th," the numbers 1 through 9, the four triangles and the thirty-six X's. A separate lamp bulb is located behind each of these translucent areas to illuminate the associated indicia selectively. When the game apparatus is placed in operation, the first coin deposited causes illumination of the indicia "1st," the second coin causes illumination of the indicia "2nd," and the third and fourth coins deposited similarly illuminate the indicia "3rd" and "4th" to thereby render an indication of the number of players using the game. The numbers 1–9 correspond to the nine holes of the game and are illuminated one at a time to indicate which hole is being played. In the apparatus according to this invention, there are only three physical holes involved. However, these three holes are opened sequentially through three sequences to provide a nine-hole game sequence. As successive holes open, illumination of the indicia advances sequentially for the numerals 1 through 9. The four triangles are illuminated one at a time to indicate which of the players is to use the game apparatus. The X's are illuminated whenever a particular player passes a golf ball through a particular hole. The control system by which such selective illumination of the particular indicia is achieved will now be described in detail with reference to the schematic diagrams.

FIGS. 10–12 form a single schematic diagram when placed together one on top of the other with FIG. 10 on top and FIG. 12 on the bottom.

The complete control system shown in these schematic diagrams can be broken down into a number of interrelated subcombination circuits each performing a separate control function. Beginning at the top of FIG. 10, there is a power supply unit for providing the various voltages required for the electrical components of the system via the conductors shown at the right-hand side of FIG. 10. The power supply also includes a latch relay which remains closed only while a game is in play, and is therefore operative to disconnect certain of the components of the control system when the game is completed so that there

cannot be further play of the game unless additional coins are deposited. Other components of the control system, e.g., components of the scoring mechanism, are connected directly to the power supply and remain operative even after the game has been completed to permit such things as comparing of scores after the completion of the game.

The inputs to the control system are seen at the lower left-hand side of FIG. 10 and include the coin switch, the ball detector switch of the automatic ball teeing device and the hole switches. The coin switch is located within the housing 75, as shown in FIGS. 1–3, and the switch is closed momentarily each time a coin is deposited via the slot 76. The ball detector switch in the automatic ball teeing device is illustrated in detail in FIGS. 7–9 and is closed momentarily each time a ball returns to the teeing device. The hole switches are illustrated in FIGS. 5 and 6, and are each associated with a different one of the holes 13 in the playing surface. One of the hole switches is closed momentarily any time a ball passes through an open hole.

The input units operate three stepping relays shown in FIG. 11, these stepping relays being designated as the player limit relay, the player selector relay and the hole selector relay. The player limit relay is advanced one digit position each time a coin is deposited, and is reset to the initial position when the game is completed. The player selector relay is advanced one digit position each time a ball returns to the automatic ball teeing device or, in other words, each time the play of a ball has been completed, and is reset each time the number of digits advanced equals the number of players using the game. The hole selector relay is advanced one digit position each time all players have had an opportunity to play a particular hole and is reset when the game is completed.

Each of the stepping relays has three sets of associated contacts, these sets of contacts being connected to make up five separate subcontrol circuits as shown in FIG. 11. Going from top to bottom of the diagram as viewed, the first of these circuits is the reset and "player up" circuit which develops an electrical pulse to reset the player selector relay and which selectively illuminates the triangular score indicia of FIG. 4 to indicate which of the players should use the game apparatus at a particular time. The next subcontrol circuit is the game end and hole indicating circuit which detects when the game is completed and develops an appropriate control pulse, and which illuminates the numerical indicia 1–9 on the scoreboard, indicating which of the nine holes is being played. The third subcontrol circuit is the hole opener circuit which selectively actuates the solenoids of the hole closure devices of FIGS. 5 and 6. The fourth circuit is the number of players circuit which illuminates the scoreboard indicia "1st," "2nd," "3rd" and 4th" in accordance with the number of coins deposited. The last of these subcontrol circuits is the score control circuit which operates the scoring matrix shown in FIG. 12.

The scoring matrix illustrated in FIG. 12 includes thirty-six latch type relays which are selectively energized whenever a player sinks a putt in a particular hole. Upon the occurrence of this event, the appropriate relay is actuated to the closed position to illuminate an associated bulb which is positioned behind the appropriate "X" on the scoreboard. The scoring matrix is so connected that the lamps remain illuminated for the remaining portion of the game and until new coins have been deposited to indicate the start of a new game.

Considering the circuits in detail, and first the power supply circuit, it is seen that this circuit comprises a pair of terminals 100 connectable to any suitable 110 volt A.C. source to energize the conductors 101 and 102 connected thereto. A transformer 103 is employed, having a 6.3-volt secondary winding 104, a 28-volt secondary winding 105, and a primary winding 106 connected between conductors 101 and 102. The ends of secondary winding 104 are connected to conductors 107 and 108 to supply 6.3 volts A.C. continuously to certain components of other circuits. One side of secondary winding 104 is connected to contacts 109 of latch relay 110. Normally, the armature 111 of this relay is in the position shown, completing a circuit through lamp 112 to conductor 107. When relay 110 is actuated, armature 111 moves downwardly and connects conductor 113 to one side of secondary winding 104. Thus, it can be seen that conductors 107 and 108 are continuously energized, and conductor 113 is energized only so long as relay 110 is in the actuated position. As will be hereinafter explained, relay 110 is actuated for the duration of the game. Illumination of lamp 112, when relay 110 is not actuated, indicates that the game has been completed or, in other words, the game apparatus is not in play.

Conductors 114 and 115 are connected to the ends of secondary winding 105 and are therefore continuously energized by the 28-volt A.C. supply. The input of rectifier 116, which contains four separate rectifiying diodes connected in conventional fashion to form a full-wave bridge rectifier, is connected across secondary winding 105. Conductors 117 and 118 are connected to the negative and positive output terminals respectively of rectifier 116, and therefore a potential of 24 volts D.C. is continuously present between these conductors. Conductor 120 is connected to the positive terminal of rectifier 116 via normally open contacts 119. Conductor 120 is energized for the duration of a game, i.e., for the duration in which relay 110 is activated.

Latch relay 110 (latch No. 1) includes a main winding 121 which is operative to move the relay armature from a normal position to an activated position. The armature of this relay, once in the activated position, remains in this position until the associated latch winding 122 is energized to release the armature, permitting it to return to the normal position. Latch relay 123 (latch No. 2) is essentially the same as latch relay 110 and comprises a main winding 124 and a latch winding 125 to control the relay armature with respect to contacts 126 and 127 between the normal and activated positions. Latch relay 123 is of the plow acting type creating a short time delay between the time main winding 124 is energized and the time when the contacts close.

One side of main windings 121 and 124 is connected to conductor 118 carrying the positive D.C. potential via coin switch 128, the other side of the main windings being connected to negative conductor 117. The first time that coin switch 128 is closed momentarily, i.e., when the first coin is deposited, the main windings of the latch relays are energized, moving the armature to the activated position. As will be described hereinafter, the associated latch windings 122 and 125 are energized to permit the armatures to return to the normal positions at the conclusion of the game.

Stepping relays 130, 170 and 210, as shown schematically in FIG. 11, are of conventional design and include advance windings 131, 171 and 211 and reset windings 132, 172 and 212, respectively. Stepping relay 130 further comprises three wiper arms 133, 134 and 135 ganged together for simultaneous rotation about their respective pivot points. Sets of contacts 136, 137 and 138 are associated respectively with wiper arms 133, 134 and 135, the contacts being circularly disposed about the pivot point of the associated wiper arm to permit the wiper arm to selectively connect with different ones of these contacts. Wiper arms 133–135 are so electromechanically connected to advance winding 131 and reset winding 132 that, upon each separate energization of the advance winding, the wiper arms all advance one digit position clockwise and, upon energization of the reset winding, return to the initial position which is the position shown in the diagram. Stepping relay 170 similarly includes wiper arms 173–175 and associated sets of contacts 176–178, and stepping relay 210 similarly includes wiper arms 213–215 and associated sets of contacts 216–218, these wiper arms and sets of contacts being interconnected to their respective advance and reset windings

for operation in like manner with respect to the corresponding elements of relay 130.

Stepping relay 130 is designated as the player limit relay and includes contacts 140–144 making up the first set 136, contacts 150–154 making up a second set 137, and contacts 160–163 making up a third set 138. Stepping relay 170 is designated as the player selector relay and includes contacts 180–184 making up a first set 176, contacts 190–193 making up a second set 177, and contacts 200–203 comprising a third set 178. Stepping relay 210 is designated as the hole selector relay and comprises contacts 220–228 making up a first set 216, contacts 230–238 making up a second set 217, and contacts 240–248 making up a third set 218.

One side of advance winding 131 is connected to positive potential conductor 118 via coin switch 128 (FIG. 10), the other side of the winding being connected to the negative conductor 117. Each time coin switch 128 is closed momentarily or, in other words, each time a coin is deposited in the apparatus, advance winding 131 is energized, advancing wiper arms 133–135 one digit position clockwise. Reset winding 132 is energized at the conclusion of the game in a manner hereinafter described.

One side of advance winding 171 of the player selector relay is connected to contact 146 of latch No. 2. Movable contact 147 is connected to movable contact 157. Contact 156 is connected to positive conductor 118 via the normally open contacts 250 of relay 251. One end of actuating winding 252 of relay 251 is connected to positive conductor 118 via ball detecting switch 253 in the automatic ball teeing device 254, the other end of the actuating winding being connected to negative conductor 117. With latch relay 123 in the activated position, this being the position for the duration of the game after the first coin has been deposited, relay winding 252 is energized each time switch 253 is closed to in turn close normally open contacts 250 and permit current to flow from positive conductor 118 through contacts 250, contact 156, movable contact 157, movable contact 147, contact 146, advance winding 171 to negative conductor 117. Thus, once latch relay 123 has been energized, advanced winding 171 in the player selector relay is energized momentarily each time ball detecting switch 253 of the automatic teeing device is closed momentarily. Reset winding 172 of the player selector relay is reset whenever the number of digits advanced is equal to the number of coins deposited, and is energized in a manner described hereinafter.

The reset and player up circuit includes the first set of contacts 136 of the player limit relay, and the first set of contacts 176 of the player selector relay, and functions to provide electrical energization to reset the player selector relay and to provide an illuminated indication identifying the player who is to use the game apparatus. This circuit includes indicating lamps 260–263 each located behind a separate one of the triangular indicia of the scoreboard illustrated in FIG. 4. Lamps 260–263 are connected between negative conductor 117 and contacts 180–183 respectively. Contacts 141–144 are connected to contacts 181–184 respectively. Wiper arm 173 is connected to positive conductor 118, and wiper arm 133 is connected to negative conductor 117 via actuating winding 264 of relay 265. Reset winding 172 of the player selector relay is connected to positive conductor 119 via normally open relay contacts 266, the other end of winding 172 being connected to negative conductor 117.

Initially, wiper arm 173 is in the position shown and therefore lamp 260 is illuminated, indicating the first player should play the game. After the first ball has been stroked and has returned to the automatic teeing device to actuate the ball detecting switch 253, the player selector relay advances one digit position, bringing wiper arm 173 in contact with contact 181, thereby illuminating lamp 261 and indicating that the second player should now play the game. Similarly, advances of the player selector relay to the third and fourth positions illuminates lamps 262 and 263, indicating the third and fourth players respectively should now play the game. The player selector relay does not advance to the fourth position in all cases as, for example, if only one player is using the game. Under these circumstances, only a single coin has previously been deposited and therefore the player limit relay has advanced one digit position, leaving wiper arm 133 in engagement with contact 141. When the player selector relay attempts to advance to the second position, so that wiper arm 173 is in contact with contact 181, a circuit is completed permitting current flow from positive conductor 118 through wiper arm 173, contact 181, contact 141, wiper arm 143, relay winding 264 to negative conductor 117. This current flow actuates relay 265, closing contacts 266 to permit current to flow from positive conductor 118 through contacts 266, reset winding 172 to negative conductor 117, thus energizing the reset winding and returning the player selector relay to the initial position. Thus, when only a single coin has been deposited, the player selector relay is reset whenever it attempts to advance to the second position. In a similar manner, if two coins have previously been deposited, the play selector relay is reset whenever it attempts to move to the third position, if three coins have been deposited, the relay is reset when moving to the fourth position, and if four coins have been deposited the relay is reset when moving to the fifth position. It is seen, therefore, that the player selector relay is reset whenever attempting to advance to one position beyond that corresponding to the number of coins deposited.

Advance winding 211 of the hole selector relay has one end connected to positive conductor 118 via normally open relay contacts 266, the other end of the advance winding being connected to negative conductor 117. Whenever relay 265 is energized to reset the player selector relay, advance winding 211 is energized, advancing the hole selector relay one digit position. In other words, the player selector relay is reset after all players have had an opportunity to play a particular hole, and the hole selector relay is advanced one digit position after all players have had an opportunity to play the hole in order, among other things, to prepare the next hole for play.

The game end and hole indication circuit comprises the second set of contacts 137 of the player limit relay, the second set of contacts 177 of the player selector relay, and the first set of contacts 216 of the hole selector relay. This circuit performs the dual function of detecting completion of a game and illuminating the numerals 1–9 of the scoreboard illustrated in FIG. 4 to provide an indication as to which hole is being played.

Indicating lamps 271–279 are each located behind a different one of the numerical indications 1–9 on the scoreboard. Lamps 271–279 are connected between conductor 107 and contacts 220–228 respectively. Wiper arm 213 is connected to conductor 108, and therefore alternating current flows between conductors 107 and 108 via wiper arm 213 and the one of the contacts and associated lamp in contact with the wiper arm. In this manner, the lamps are illuminated sequentially as the hole selector relay advances to successive holes.

The game is completed whenever nine, eighteen, twenty-seven or thirty-six balls, depending upon the number of players, have been detected by switch 67. A circuit for detecting when the last ball has been placed in playing position is completed by engagement of wiper arm 174 with contact 228, by connecting contacts 151–154 to contacts 190–193, respectively, and by connecting wiper arm 134 to conductor 107 via actuating winding 280 of relay 281. Assume, for example, that four players are using the game and have each had an opportunity to play eight holes. Under these circumstances, the player limit relay has advanced four digits and wiper

arm 134 is in contact with contact 154 and, when the last player plays the eighth hole, the player selector circuit is reset to the initial position and the hole selector relay is advanced to the ninth digit position with wiper arm 213 in contact with contact 228. Under these circumstances, the game is completed when the player selector relay advances four more digit positions to bring wiper arm 174 in contact with contact 193. At this point, current flows through wiper arm 213, contact 228, wiper arm 174, contact 193, contact 154, and wiper arm 134, energizing relay winding 280. Similarly, if only three players were using the game, relay winding 280 would be actuated when wiper arm 174 is engaged with contact 192, or if two players are using the game, when wiper arm 174 connects with contact 191. If one player is using the game the relay winding is energized as soon as the hole selector relay reaches the ninth digit position and the player selector relay reaches its initial position after being reset.

Winding 285 of relay 282 has one end connected to conductor 107, and the other end connected to movable contacts 147 and 157 of latch relay 123. When coin switch 126 is actuated to the closed position before latch relay 123 is actuated, a condition which occurs when the first coin is deposited because latch relay 123 is slow-acting, a circuit is completed which permits current to flow from positive conductor 118 through coin switch 128, contact 145, movable contact 147, relay winding 285 to negative conductor 117 actuating relay 282. After latch relay 123 has been actuated, relay 282 is actuated whenever contacts 250 are closed by current flowing from positive conductor 113 through contacts 250, contact 156, movable contact 157, and relay winding 285 to negative conductor 117. It is seen, therefore, that relay 282 is actuated under two conditions, namely, when the first coin is deposited, and thereafter whenever switch 253 in the automatic ball teeing device is closed to, in turn, close contacts 250.

Relay 281 has a set of normally open contacts 283 and a set of normally closed contacts 284. Whenever relay winding 280 is energized, the associated relay contacts move to the opposite condition. Relay 282 includes two pairs of normally open contacts 286 and 287 which are moved to the closed position whenever the associated relay winding 285 is energized.

The actuating solenoid winding 290 in the automatic ball teeing device is connected across the 110-volt source by having one end thereof connected to the source via conductor 101, and the other end connected to the other terminal of the source via normally closed contacts 284, normally open contacts 287 and conductor 102. Since contacts 284 are normally closed, and remain closed until the end of the game is detected, solenoid 290 is energized each time contacts 287 are closed, or in other words, each time relay 282 is energized. When the end of the game is detected, relay 281 is energized and contacts 284 open, thereafter preventing the solenoid 290 from being actuated and, hence, no further balls can be positioned in the teeing area.

It should be noted that the teeing of the last ball into position occurs in response to the closing of switch 253 and that the actuation of relay 281 signifying the end of the game also occurs in response to the closing of switch 253 when the player selector relay is advanced. However, there is a certain amount of time delay required for the player selector relay to advance this one last digit position, and therefore contacts 284 remain closed sufficiently long to actuate solenoid 290 to tee up the last ball.

At the end of the game, all of the latch relays and the stepping relays must be reset to their initial position to ready the game apparatus for new players. However, they cannot be reset until the last ball has completed its path and returned to the ball teeing device. Accordingly, latch windings 122 and 125 of latch relays 110 and 123, respectively, and reset windings 132 and 212 of the player limit relay and the hole selector relay each has one end thereof connected to positive conductor 118 via contacts 233 and 236, the other end of each of these windings being connected to negative conductor 117. When the last ball is teed into position, relay 281 is actuated and contacts 283 close. Subsequently, when the last ball returns to the ball teeing device, relay 282 is actuated and contacts 286 close. When both contacts 283 and 286 are closed, current flows through both of the closed contacts and through latch windings 122 and 125, and reset windings 132 and 212. One end of relay winding 291 is connected to the movable member of contacts 283, the other end being connected to negative conductor 117. Therefore, when both contacts 283 and 286 are in the closed position, relay winding 291 is energized, closing the associated normally open contacts 293. Contacts 293 are connected between one end of reset winding 172 and positive conductor 118, and therefore when contacts 293 close, reset winding 172 is energized.

The function of the hole opener circuit is to selectively energize the three solenoid windings associated with the hole closure devices. The hole opener circuit includes the second set of contacts 217 of the hole selector relay. Actuating winding 296 of relay 295 has one end connected to contacts 230, 233 and 236, the other end of the winding being connected to negative conductor 117. Relay winding 298 of relay 297 has one end connected to contacts 231, 234 and 237, the other end thereof being connected to the negative conductor. Relay winding 300 of relay 299 has one end thereof connected to contacts 238, 235 and 232, the other end thereof being connected to the negative conductor. Each of the relays 295, 297 and 299 has an associated set of normally open contacts 301—303, respectively. Solenoid windings 304–306 are each associated with a different one of the three hole closure devices and, when energized, actuate their respective devices to the hole open position. One end of each of these solenoids is connected to negative conductor 117 while the other end is connected to the positive conductor 118 via contacts 301–303, respectively. Wiper arm 214 is connected to positive conductor 120 and is therefore energized subsequent to the closing of latch relay 110.

When the first coin is deposited, latch relay 110 closes, energizing wiper arm 214, permitting current flow which actuates relay 295, so that contacts 301 are closed and solenoid winding 304 is energized to open hole 1. Subsequently, after each player has had an opportunity to play the first hole, the hole selector relay advances one digit and therefore relay 297 is actuated, energizing solenoid winding 305 to open hole 2. In like manner, the next advance of the hole selector relay opens hole 3, the following advance opens hole 1 again, etc. It is seen, therefore, that the holes are opened in the sequence one, two, three; one, two, three; and one, two, three, or, in other words, the holes are opened sequentially, each hole being opened three times to make up the nine hole course or sequence.

The number of players circuit comprises the third set of contacts 133 of the player limit relay and is operative to provide an indication of the number of players using the game. Indicating lamp 316 is located behind the indicia "1st" as shown on the scoreboard of FIG. 4. Lamps 313–315 are all located behind the indicia "2nd" so that any one of the lamps may illuminate this indicia. Lamps 311 and 312 are similarly located behind the indicia "3rd" and lamp 310 is located behind the indicia "4th." Lamp 316 is connected between conductors 107 and conductors 113 and is therefore illuminated in response to deposit of the first coin which closes latch relay 110, permitting current flow through contacts 109 and conductor 113. Indicating lamps 310, 312 and 315 are connected in parallel between contact 164 and conductor 107. In like manner, lamps 311 and 314 are connected between contact 163 and the negative conductor and lamp 313 is connected between contact 162 and the negative conductor.

When a first coin is deposited, lamp 316 is energized and the indicia "1st" is illuminated. Wiper 135 of the player limit relay, which advances one digit per coin deposited, is positioned in contact with contact 162 if two coins are deposited and, therefore, lamp 313 is energized and the indicia "1st" and "2nd" are illuminated. If three coins are deposited, lamps 311, 314 and 316 are energized and the indicia "1st," "2nd" and "3rd" are illuminated, and in like manner if four coins are deposited lamps 310, 312, 315 and 316 are energized and all four indicia are illuminated.

The score control circuit includes the third set of contacts 178 of the player selector relay and the third set of contacts 218 of the hole selector relay. The function of this circuit is to control the scoring matrix shown in FIG. 12.

Wiper arm 215 of the hole selector relay is connected directly to one side of secondary winding 105 via conductor 114. Wiper arm 175 is connected to the other side of secondary winding 105 via conductor 323, hole switches 320–322 and conductor 115. Hole switches 320–322 are connected in parallel with one another and are each associated with a separate one of the hole closure devices. These switches are so arranged in the hole that the switch is closed momentarily when a ball passes through the open hole. Whenever any one of the hole switches 320–322 is closed, 28 volts A.C. is present between wiper arms 175 and 215. Conductors 330–333 are connected to contacts 200–203, respectively, and conductors 340–348 are connected to contacts 240–248, respectively.

The scoring matrix comprises thirty-six latch-type relays 331–389, each of these relays having an actuating winding and an associated set of normally open contacts. Each set of contacts is connected in series with an indicating lamp, the series combination being connected across the 6.3-volt secondary winding 104 via conductors 107 and 108. The indicating lamps are each positioned behind a different one of the thirty-six X's on the scoreboard illustrated in FIG. 4. The indicating lamps in the left-most column correspond to the holes made by the first player, the lamps going from top to bottom corresponding to the holes 1 through 9, respectively. Similarly, the indicating lamps in the next column from the left correspond to the second player, and the remaining two columns correspond to the third and fourth players, respectively.

The relays 351–389 are of the mechanical latch type in which the movable contact once closed is latched in the closed position by means of a mechanical holding arrangement. The latches are all mechanically connected to a latch release solenoid 390 which simultaneously releases all latches when energized. It is desirable that the game score remain on the scoreboard after a game is completed, but, of course, must be removed before a new game is started. The game score is removed by the first coin deposited for a subsequent game to current flowing from positive conductor 118, coin switch 128, movable contact 147, movable contact 157 to contact 155 and through winding 390. This action takes place only in response to the first coin deposited since slow-acting relay 123 thereafter breaks the circuit through movable contact 157 and stationary contact 155.

One end of each of the relay windings associated with relays 351–359 is connected to conductor 330. In like fashion, relay windings of relays 361–369 are connected to conductors 331, relay windings associated with relays 374–379 are connected to conductor 331, and relay windings associated with relays 381–389 are connected to conductor 333. The remaining end of the relay windings are connected to one of the conductors 341–349. Relay windings associated with relays 351, 361, 371 and 381 are connected to conductor 341, relay windings associated with relays 352, 362, 372, 382 are connected to conductor 342, relay windings associated wtih relays 353, 363, 373, 383 are connected to conductor 343, relay windings associated with relays 354, 364, 374, 384 are connected to conductor 344, relay windings associated with relays 355, 365, 375, 385 are connected to conductor 345, relay windings associated with relays 356, 366, 376, 386 are connected to conductor 346, relay windings associated with relays 357, 367, 377, 387 are connected to conductor 347, relay windings associated with relays 358, 368, 378, 388 are connected to conductor 348, and relay windings associated with relays 359, 369, 379, 389 are connected to conductor 349.

Since the player selector relay is advanced in accordance with which player is using the game and the hole selector relay is advanced in accordance with which hole is being played, it is apparent that whenever a ball passes through a hole, momentarily closing one of the hole switches 320, 322, current will flow from wiper arm 175 through the appropriate relay back to wiper arm 215, thus illuminating the lamp associated with the X to properly indicate the score on the scoreboard of FIG. 4.

While one advantageous embodiment of the present invention has been illustrated, it is obvious that numerous departures can be made without departing from the scope of this invention as more particularly set forth in the appended claims.

What is claimed is:

1. In a coin operated golf game apparatus, the combination of

means forming a playing surface provided with a plurality of holes;

electrically operated means for selectively designating individual ones of said holes as ready for play;

coin switch means;

first digital counting means controlled by said coin switch means for establishing a player count dependent upon the total value of coins by which said coin switch means is operated;

second digital counting means capable of advancing digitally to a number equal to a multiple of the total of said holes;

first circuit means controlled by said second counting means and connected to said electrically operated means to operate the latter for successively designating the individual ones of said holes as ready for play in accordance with digital advance of said second counting means such that the successive designations of said holes is repeated when said second counting means advances digitally to a number exceeding the total number of holes, control means actuated successively by placing of balls in play; and

second circuit means controlled by said control means and connected to said second counting means to cause said second counting means to advance in accordance with the placing of balls in play.

2. A coin operated golf game apparatus in accordance with claim 1 and wherein

said control means is a ball detector switch disposed to detect passage of each ball in play.

3. A coin operated golf game apparatus in accordance with claim 2 and wherein

said second circuit means is operative to advance said second counting means by one digit in response to a total number of successive operations of said ball detector switch equal to the player count established by said first counting means.

4. A coin operated golf game apparatus in accordance with claim 3 and further comprising

a plurality of ball detector devices each associated with a different one of said holes to detect passage of balls therethrough;

a plurality of electrically operated indicating devices; and

scoring circuit means controlled jointly by said second counting means and said ball detector devices and connected to said indicating devices to operate the latter selectively whenever one of said ball detector

devices is operated by passage of a ball through the corresponding one of said holes.

5. A coin operated golf game apparatus in accordance with claim 4 and further comprising

means controlled by said first and second counting means for terminating operation of the apparatus in response to playing of the last hole by the last player,

said scoring circuit means including means maintaining said indicating devices in their operated condition until said coin switch means is again operated.

6. In a coin operated golf game apparatus, the combination of

means forming a playing surface provided with a plurality of holes;

electrically operated means for selectively designating individual ones of said holes as ready for play;

an electrically operated ball teeing device;

ball return means arranged to collect played balls and deliver the same sequentially to said teeing device;

coin operated switch means;

first digital counting means controlled by said coin switch means for establishing a player count dependent upon the total value of coins by which said coin switch means is operated;

second digital counting means;

ball detector means operatively associated with said ball return means for actuation by each ball delivered thereby;

first circuit means placed in operation by said coin operated switch means and connected to said second counting means to advance the same, said first circuit means including said ball detector means and being conditioned thereby to advance said second counting means by one digit each time said ball detector means is actuated;

second circuit means connected to said second counting means to reset the same when said second counting means has advanced by a number of digits equal to the player count established by said first counting means;

third digital counting means;

third circuit means connected to said third counting means to advance the same, said third circuit means being responsive to resetting of said second counting means and operative to advance said third counting means by one digit in response to each resetting of said second counting means; and

fourth circuit means connected to operate said electrically operated means, said third counting means being connected to said fourth circuit means and the latter being effective to operate said electrically operated means to cause successive designation of the individual ones of said holes as ready for play in accordance with digital advance of said third counting means.

7. A coin operated golf game apparatus in accordance with claim 6 and wherein

said third counting means is capable of advancing digitally to a number equal to a multiple of the total of said holes and said fourth circuit means is connected to cause successive designation of said holes to be repeated when said third counting means advances digitally beyond said total.

8. In a coin operated golf game apparatus, the combination of

means forming a playing surface with a plurality of holes less than nine;

a plurality of electrically operated devices disposed for view by the players and operative to denote individual ones of said holes;

coin operated switch means;

first digital counting means controlled by said coin operated switch means for establishing a player count dependent upon the total value of coins by which said coin operated switch means is operated;

second digital counting means capable of advancing to a number greater than the total of said holes;

means defining an area from which balls are to be played;

means for supplying balls to be played;

sensing means actuated successively in accordance with the placing of balls in play;

first circuit means connected to said electrically operated devices and controlled by said first and second counting means for selectively operating said electrically operated devices through a sequence of operations with the total number of operations of said sequence being an integer greater than the total of said holes; and

second circuit means controlled by said sensing means and connected to said second counting means to cause said second counting means to advance in accordance with the placing of balls in play.

9. A golf game apparatus in accordance with claim 8 and further comprising

electrical control means responsive to operation of said first counting means and operatively arranged to limit the number of balls supplied to the product of said integer multiplied by the player count established by said first counting means.

10. A golf game apparatus in accordance with claim 8 and wherein

said electrically operated devices are each located at a different one of said holes.

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