

Aug. 9, 1938.

F. A. MITCHELL ET AL

2,126,570

APPARATUS FOR PLAYING A BALL GAME

Filed July 22, 1935

4 Sheets-Sheet 1

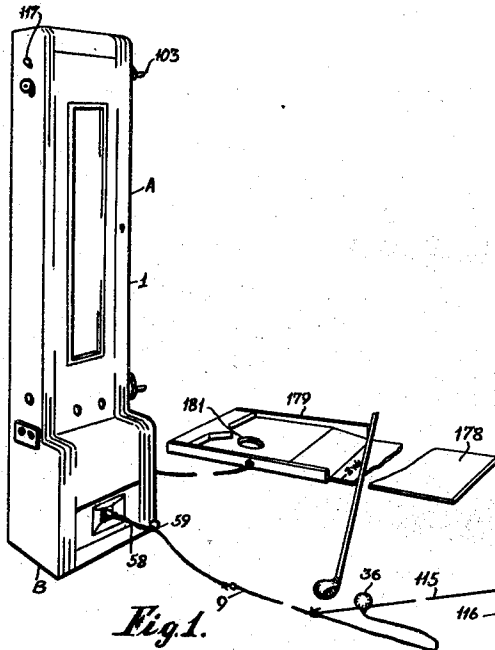


Fig. 1.

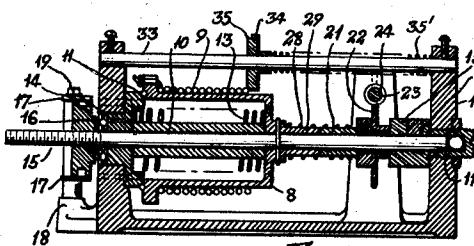


Fig. 3.

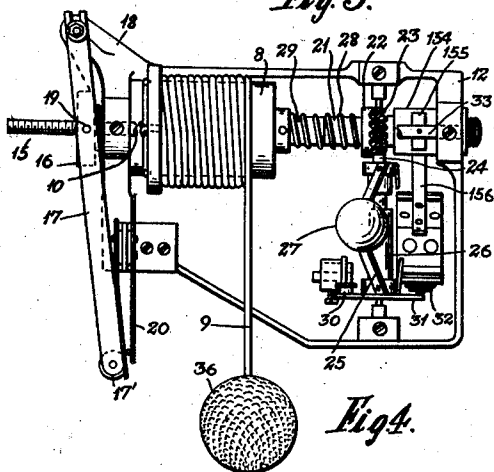
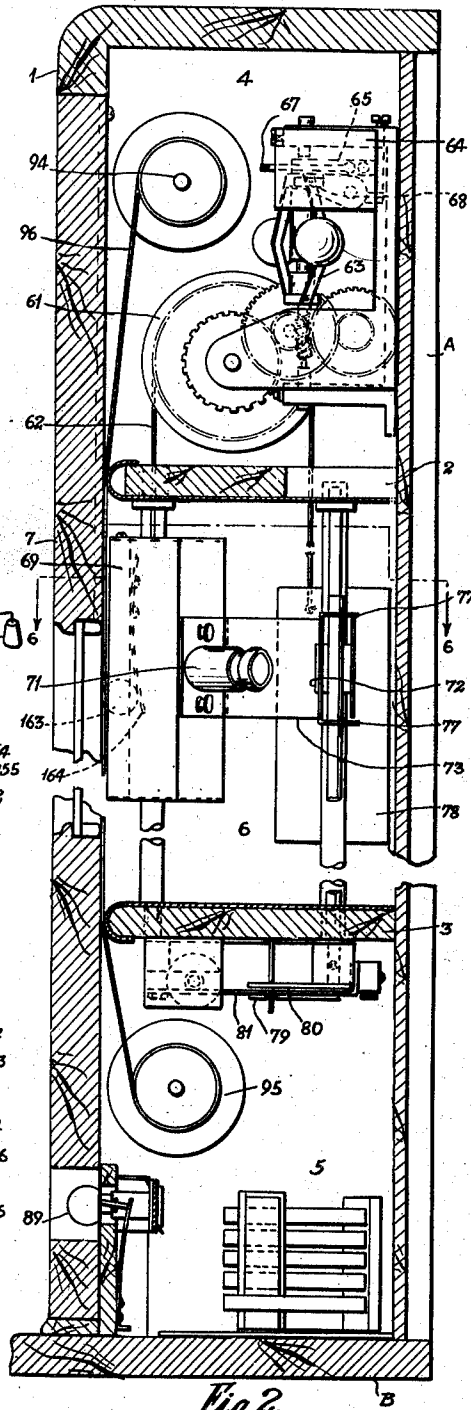


Fig. 4.



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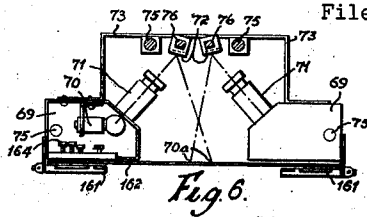


Fig. 6.

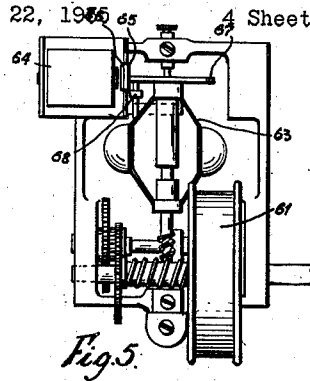


Fig. 5.

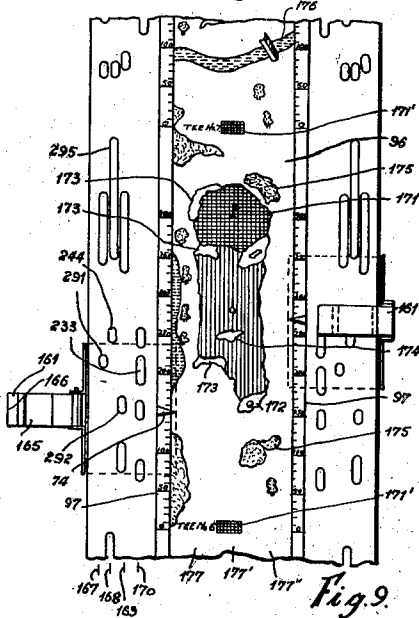


Fig. 9.

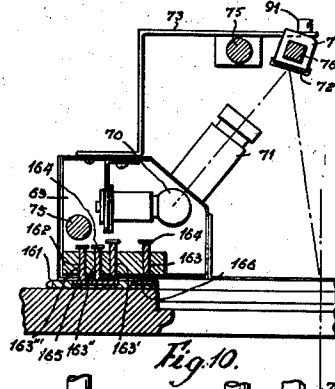


Fig. 10.

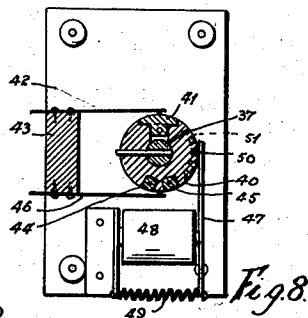


Fig. 8.

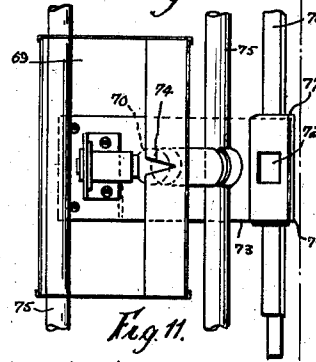


Fig. 11.

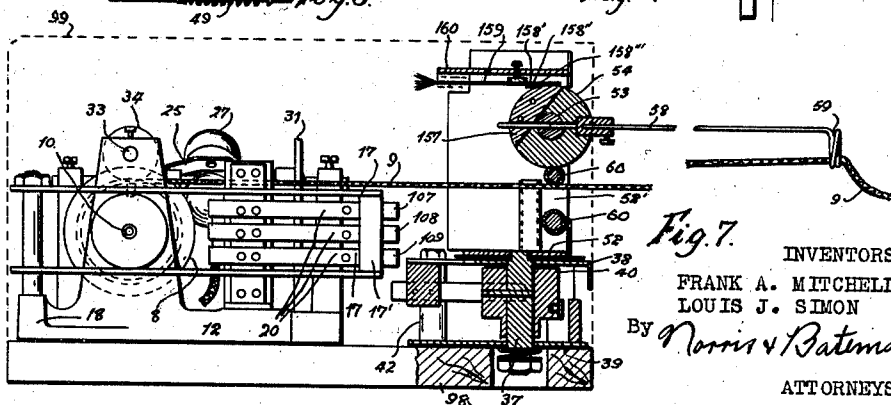


Fig. 7.

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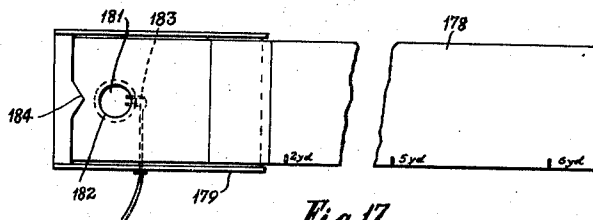


Fig. 17.

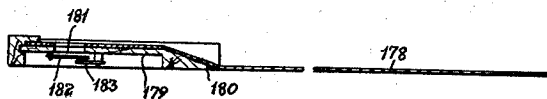


Fig. 18.

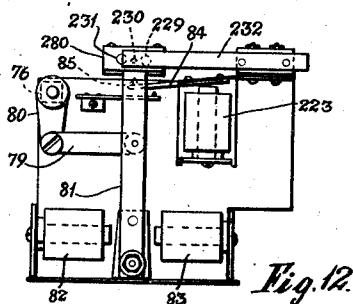


Fig. 12.

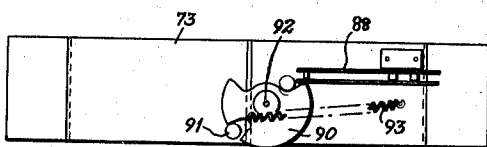


Fig. 13.

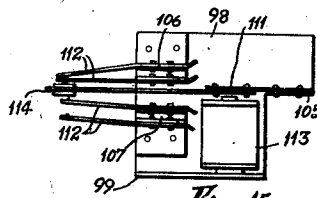


Fig. 15.

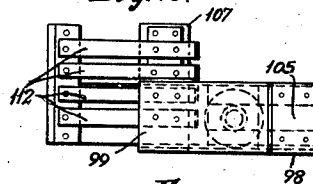


Fig. 16.

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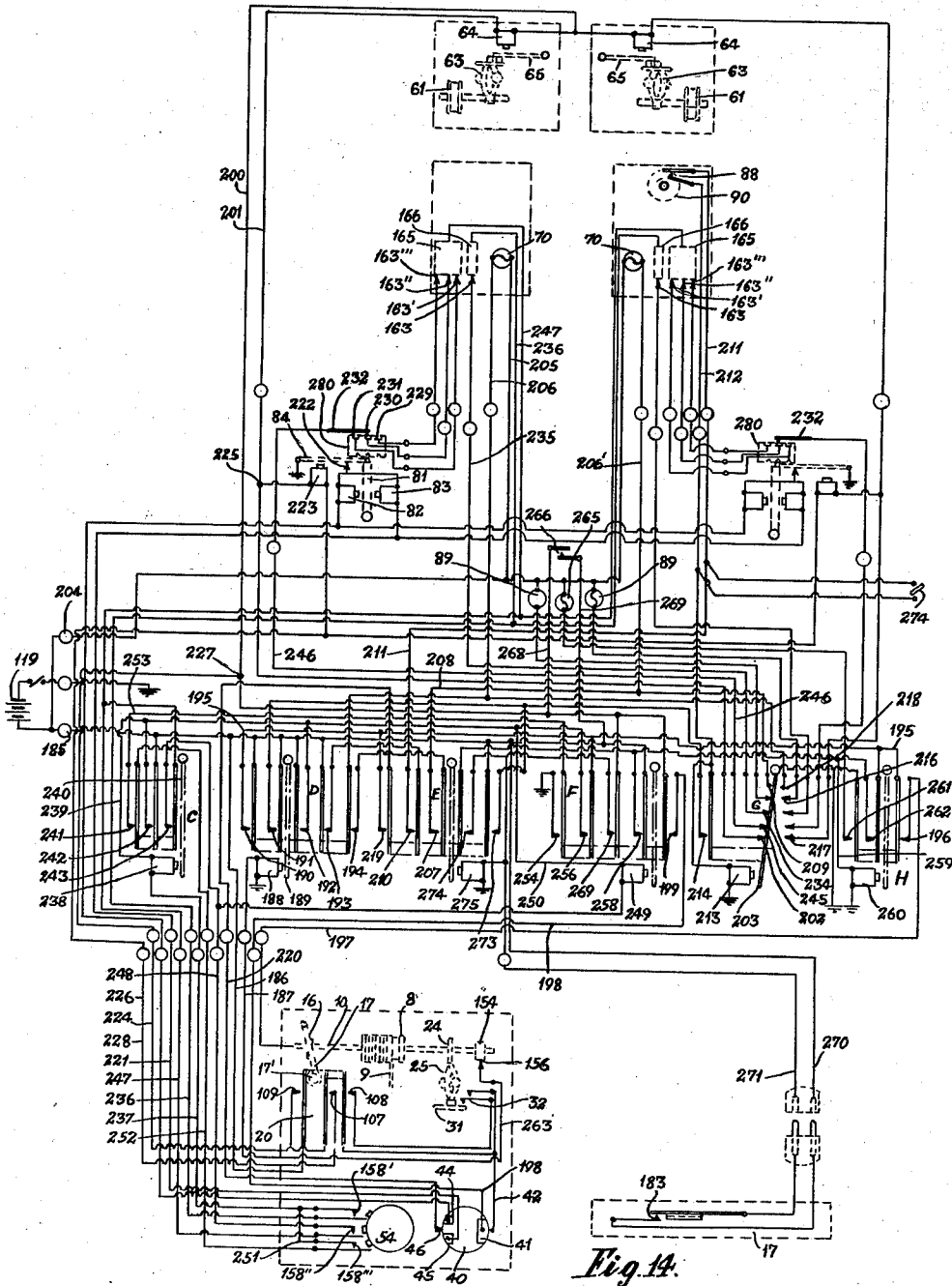


Fig. 14.

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UNITED STATES PATENT OFFICE

2,126,570

APPARATUS FOR PLAYING A BALL GAME

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Application July 22, 1935; Serial No. 32,610
In Great Britain March 19, 1935

15 Claims. (Cl. 273-87)

This invention relates to an apparatus for playing a ball game, for example a ball game simulating golf which enables the game to be played in a limited space, the ball being struck in the usual manner by a club, but the extent of the flight of the ball being limited, and means being provided for operation in accordance with the nature of the blow imparted to the ball to afford an indication to the player of the result and efficacy of his stroke.

An example of such a game forms the subject of our co-pending application Serial No. 32,609 filed July 22, 1935; the ball in that case being anchored by a cord to movable elements which are moved by the cord to an extent which corresponds to the force of a blow imparted to the ball, the movable elements in turn controlling an indicator arranged to afford an indication on a chart bearing a representation of a golf course, of the flight of the ball had it been free to travel over an ordinary open course.

The primary object of the present invention is to provide an improved ball game apparatus which in addition to testing the ability of a player to control the length or length and direction of travel of the ball, will present hazards or obstacles to the player, the hazards being such that they can only be overcome by imparting loft to the ball, that is to say imparting blows to the ball which will cause it to travel over a suitably elevated trajectory. By this means a game more closely simulating real golf may be played with the improved apparatus.

A further object of the invention is to provide means whereby the putting ability of the player may be tested.

A further object is to provide an apparatus having the above improved features, which is adapted to be used by two players playing competitively.

In accordance with the present invention therefore there is provided an apparatus for playing a ball game, comprising means to limit the flight of the ball when struck by a player, an indicator, means for operating said indicator in accordance with the force of the blow imparted to the ball and means adapted to prevent operation of said indicator when a stroke is made which fails to impart a required predetermined minimum loft to the ball.

In the at present preferred arrangement the indications are arranged to be observed upon a chart bearing a representation of a golf course complete with tees, greens, holes and the usual forms of hazards found on courses such as

bunkers, streams, groups of trees and so on, and the arrangement is such that when a player's ball is shown to be in, or in the region of a hazard, the indicator operating means is automatically set to prevent an indication of progress beyond the hazard until an appropriately lofted shot is executed.

The invention is illustrated by way of example in the accompanying drawings as applied to an embodiment in which the ball to be played is connected to the apparatus by a cord, the machine illustrated being adapted for use by two competing players.

In the drawings:—

Fig. 1 is a general perspective view of the complete apparatus.

Fig. 2 is a view in sectional side elevation of the upper part of the cabinet containing the greater part of the apparatus, the figure being foreshortened for the sake of convenience.

Figs. 3 and 4 are side elevation and plan views respectively of a drum on which the ball anchorage cord is wound, and of the mechanism related thereto.

Fig. 5 is a view in front elevation of a gravity motor as used for moving an indicator.

Fig. 6 is a sectional plan view on a smaller scale taken on the line 6-6 of Fig. 2.

Fig. 7 is a view in end elevation partly in section showing the cord controlled motor and the direction control turret in their relative positions.

Fig. 8 is a sectional plan view of the control turret taken on the line 8-8 of Fig. 7.

Fig. 9 is a view of a part of a chart for use in the apparatus according to the invention.

Figs. 10, 11, 12 and 13 show details of the indicating mechanism.

Fig. 14 is a diagram of the electrical circuit which may be used.

Figs. 15 and 16 show details of a switch assembly suitable for use with the apparatus according to the present invention.

Figs. 17 and 18 are plan and side elevational views of a putting board.

Referring to the drawings Figs. 1 and 2, 1 is a vertically elongated cabinet comprising an upper part A and a lower part B. The upper part A is divided by two partitions 2 and 3 into three compartments, top and bottom compartments 4 and 5 and a long intermediate compartment 6.

The front of the three compartments is closed by a door 7 having a glass panel extending over the intermediate compartment 6.

In the bottom B of the cabinet is mounted a

motor shown in detail in Figs. 3, 4 and 7 and comprising a drum 8 on which a cord 9 is adapted to be wound, one end of said cord being fixed to the drum while the free end has attached to it the ball 36.

This drum 8 is mounted fast on a horizontal spindle 10 carried in bearings 11 in a frame 12 and a spring 13 is provided within the drum one end of said spring being connected with the drum 8 and the other end with a fixed member 14 in such a manner that the spring 13 is tensioned when the cord 9 is drawn off the drum 8 and the latter rotated. One end of the horizontal spindle 10 is screw threaded as shown at 15 and projects beyond one of the end bearings 11 and on this threaded end is carried a non-rotatable nut 16.

Two parallel levers 17 are pivoted at one end to a lug 18 on the frame 12 and are connected intermediate their length at opposite points 19 to the nut 16, while the other end co-operates through a contact bar 17' with a group of vertically arranged switch blades 20, Figs. 4 and 7. The arrangement is such that when the drum 8 is rotated by the pull of the cord 9, the nut 16 and lever 17 are moved to open two switches 107 and 108 and to close one switch 109 of a group 20 (see Fig. 14) and the functions of these switches will be described later.

The other end of the spindle 10 carries a sleeve 21 bearing a worm gear 22 which meshes with a worm 23 on the spindle 24 of a centrifugal governor of the kind commonly used in talking machine motors and comprising a series of leaf springs 25 fixedly anchored at one end to the spindle 24 and connected at the other end to a sleeve 26 slidable on the spindle 24 and each bearing a weight 27 which moves outwards under centrifugal force when the governor spindle 24 is rotated to cause the sleeve 26 to move longitudinally of the governor spindle 24.

The sleeve 21 bearing the worm gear 22 is normally free on the drum spindle 10 but is adapted to be clutched thereto when the drum 8 is rotated in that direction which winds the cord 9 thereon. The clutch device may conveniently be formed by a coiled spring 28 wound around the sleeve 21 and a corresponding sleeve extension 29 on the drum 8 and arranged to tighten and rotate the sleeve 21 when the drum 8 is rotating in the required direction.

An adjustable friction pad 30 of usual type is provided to limit the governor speed as desired by engagement with a friction disc 31 on the sliding collar 26 of the governor. This friction disc is also adapted to engage with a contact spring to close a switch 32 (Fig. 14) in an electric circuit when the governor is rotating. The governor is also arranged to make a longitudinal movement of small extent upwards in Fig. 4 and as a whole, when or before commencing to rotate such as will bring disc 31 into contact with the lower blade of switch 32 but without closing switch 32.

Near one end of spindle 10 is fixedly mounted a collar 154 of insulating material having a metallic insert 155 in contact with the spindle 10, and a leaf spring 156 mounted on a suitable insulated anchorage on the frame 12 engages the collar 154 with its free end so that during rotation of spindle 10 intermittent contact is made between the leaf spring 156 and the metal insert 155 for a purpose yet to be described.

On a rod 33 arranged above and parallel to the axis 8 of the drum is carried a sliding and rotating collar 34 having a shaped edge 35 and this

collar 34 is urged by a spring 35' into engagement with the cord 9 to ensure its being satisfactorily wound on the drum 8. The above described motor is arranged within the part B of the cabinet and in front of said motor is mounted means adapted to be influenced in accordance with the direction of the flight of the ball 36 on cord 9 when struck and to correspondingly affect the indicating means. Such means will be referred to generally as the direction turret. The direction turret is illustrated in Figs. 7 and 8 and comprises a vertical spindle 37 mounted for rotation in bearings in fixed upper and lower plates 38 and 39 themselves carried on a baseboard 98. The spindle 37 carries a horizontal disc 40 of insulating material in one side of which is a metallic contact 41 of limited circumferential length which in the normal position shown in Fig. 8 is engaged by a spring contact 42 on a fixed part 43 of the structure. On the opposite side of the horizontal disc 40 are provided two spaced metallic contacts 44, 45, and a further spring contact 46 anchored on the fixed part 43 normally engages the surface of the disc 40 between these metallic contacts 44, 45, but can engage either one of the metallic contacts when the horizontal disc is rotated to a limited extent in one direction or the other.

Means may be provided if desired, to lock the horizontal disc 40 in a desired position, such means comprising an arm 47 urged in one direction by an electro-magnet 48 and in the other direction by a spring 49 said arm 47 having a pin 50 on its end adapted to be engaged in any one of a series of recesses 51 in the periphery of the disc 40.

On the upper end of the vertical spindle 37 is fixedly mounted a yoke 52 between the limbs 52' of which is carried a rotatable horizontal spindle 53 bearing a vertically arranged disc 54 in which is fixedly mounted a wire arm 58, this arm 58 extending horizontally and bearing an eye 59 on its extremity through which passes the ball anchorage cord 9. The disc 54 is provided with metallic inserts 157, the peripheries of which are engaged by a number, in the case illustrated three contacts 158', 158'' and 158''' carried by spring contact blades 159 mounted on a member 160 spanning the yoke 52. The contacts 158', 158'' and 158''' are staggered with regard to one another so that contact with insert 157 is broken or made by one contact or several in succession as the disc 54 is moved about the axis of spindle 53. Rollers 60 are provided one above the other and across the yoke 52 between which the cord 9 is guided but with considerable latitude.

The above described cord controlled motor and the direction turret may be conveniently mounted on a baseboard 98 common to both and adapted to be inserted in compartment B or if desired a cover 99 may be provided, Fig. 7.

In the upper compartment 4 of the cabinet 1 are mounted two similar gravity motors, one at each side, one only being shown in Figs. 2 and 5. Each of these motors comprises a driving pulley 61 over which runs a belt 62 and the pulley is geared to a governor 63 similar to that described above in connection with the cord drum mechanism.

In conjunction with the governor 63 of each gravity motor is mounted an electro-magnet 64, the armature 65 of which bears a brake pad 66 for co-operation with the governor friction disc 67 and the arrangement is such that when the magnet 64 is energized, the brake pad 66 is with-

drawn from contact with the governor disc 67 and the motor freed to run but when the electro-magnet circuit is broken the pad 66 engages the disc 67 and holds the motor stationary. An auxiliary pad 68 is provided to enable the speed of the gravity motor to be preliminarily fixed and it will be understood that both gravity motors are set to run at the same speed.

Within the main central compartment 6 of the cabinet are mounted two lamp carriers 69, one at each side. Each carrier 69, Figs. 2, 6, 10 and 11 comprises a box-like structure within which is mounted an electric lamp 70 and carrying on its exterior an optical system 71 whereby a pencil of light from the lamp 70 is directed rearwardly and caused to impinge upon a mirror 72 carried upon a bracket 73 rigid with the carrier 69.

Preferably each carrier housing 69 is provided also with an arrow-shaped aperture 74 at the front, Fig. 11, to permit light to be directed to the front of the machine from the lamp within the carrier 69.

The carriers 69 are arranged for vertical movements each on two fixed guide rails 75; and the mirrors 72, are arranged for rocking movements about a vertical axis on the brackets 73, through the engagement of movable square or other suitable section vertical rods 76 in square or other shaped holes in lugs 77 on the mirror supports the lugs 77 overlapping and engaging the edges of bracket 73 however, so that the mirrors 72 are constrained to move vertically with the carriers. Each carrier 69 is connected to one end of a pulley belt 62 of one of the gravity motors, the other end of each belt 62 being connected to a counterweight 78. It will readily be seen that when one or other of the gravity motors is released to run, the corresponding carrier 69 is caused to rise under the pull of the counterweight 78 at a speed determined by the governor 63 and for so long as the gravity motor is permitted to run. Means such as a winding crank 103 (Fig. 1) may be provided to return the carriers 69 to the lowered position when they have run the full length of the compartment 6.

The fixed guide rods 75 for the carriers 69 are mounted in the partitions 2 and 3 between the compartments 4, 6 and 5 and the rockable square shafts 76 are carried in bearings in said partitions the lower ends of shafts 76 extending below the lower partition 3. At the lower end each square shaft 76 is connected through a lever system 79, 80. Figs. 2 and 12 to a rocking armature 81 arranged between two electro-magnets 82, 83 and the arrangement is such that a square shaft 76 and consequently a mirror 72 is rocked to one side or the other of the normal position according to which of the magnets 82 or 83 is excited. A spring mounted arm 84, the position of which is controlled by an electro-magnet 223 carries a pin 85 on its end and this pin 85 engages in one or other of several apertures in a member carried by the armature 81 to maintain the latter in one or other of its deflected positions and in consequence, the square shaft 76 and mirror 72 in the corresponding position until the electro-magnet 223 is excited. One shaft 76 only is shown in Fig. 12 but it will be understood that the other shaft 76 is connected through a similar lever system, with a similar armature 81 magnetically controlled.

At the free end of the armature 81 is carried a member 280 bearing three separate contacts 75 229, 230 and 231 any one of which is engaged

with the end of a fixedly mounted spring contact arm 232 according to the position of the armature 81.

On the front of each carrier 69 is hingedly mounted a flap 161 (Figs. 6, 9 and 10) the flaps being formed of insulating material and in their normal position being folded down on the front of the carriers as shown in Figs. 6 and 10, but being capable of being turned out as shown at the left of Fig. 9.

In the front of each carrier 69 is carried an insulating block 162 having a number of slits (four in the case illustrated) formed therein, in which are housed metal rollers 163, 163', 163'' and 163''', the rollers being urged yieldingly, as by springs 164, towards the flaps 161 and being adapted to close electrical circuits by contacting with metal plates 165 and 166 fixed on the rear surfaces of the flaps.

The arrangement is such that any one or more of the three rollers 163', 163'' and 163''' may contact with a common plate 165 while the fourth roller may contact with plate 166 only.

Each of the three rollers 163', 163'' and 163''' is in electrical connection with one of the three contacts 229, 230 and 231 described above as being provided on the end of armature 81.

The functions of the electrical circuits closed by the rollers 163, 163', 163'' and 163''' will be described later.

On the bracket 73 fixed to one carrier 69 (the right hand carrier in Fig. 13) is mounted a spring change over switch 88, Fig. 13, a function of which amongst others is to light one or other of two indicating lights 89 horizontally spaced from one another and preferably of different colours, arranged on the front of the machine, (Fig. 2), to indicate which of the carriers 69 is in the lowest position. The coloured lights correspond to the different players. On the same bracket 73 is a movable cam device 90 adapted to be moved between two positions in one of which said switch 88 is permitted to open and in the other of which said switch 88 is held closed.

On the bracket 73 of the other carrier 69 is fixed a pin 91 which engages the cam 90 whenever one carrier 69 moves past the other to reverse the position of said cam 90 and as a consequence open or close the switch 88. The cam 90 is mounted on a pivot pin 92 and a spring 93 is provided to snap the cam 90 sharply about its pivot as soon as the operating pin 91 has caused the spring 93 to pass the dead centre.

The arrangement is such that one or other of the coloured lamps is lit according to which of the carriers is lowermost, the cam 90 being rocked whenever one of the two carriers 69 moved upward past the other, so that a clear indication is afforded to the hindmost player that he is due to take the next stroke.

In the upper and lower compartments 4, and 5 are mounted one each of a pair of rollers 94 and 95 on which are wound the ends of a chart 96 bearing a representation of a golf course showing for example a number of greens 171, tees 171' and hazards such as bunkers 172, 173, 174 etc., bushes 175, streams 176 and so on, the hazards being arranged on a number of parallel lines, say three, indicated at 177, 177', 177'' longitudinally of the chart. The bunkers may bear a figure to indicate their height.

The chart 96, which is formed of semi-transparent paper for example, extends over the large central compartment and is held against

the rear of the door 7 or the glass panel therein, the edges of the chart however passing between the flaps 161 and the front surfaces of the respective carriers 69. The arrangement is such that a new section of golf course can be brought into view against the glass panel by turning a roller 94 or 95 when a section has been played over.

The chart 96 bears at each side a scale 97 marked to represent yards on the course and for register with the arrow-shaped apertures 74 referred to above as being provided at the front of the carriers 69 to indicate the length of the stroke and the aggregate distance played over by the respective players.

The chart 96 is also provided in each margin with a series of slots or perforations arranged in rows, each margin in the case illustrated being provided with four parallel rows of slots 167, 168, 169 and 170, each row being arranged in alignment with one of the rollers 163, 163', 163'' and 163''' referred to above as being provided on the carrier 69.

The slots in three rows 167, 168 and 169 at each side of the chart are arranged opposite hazards and greens in corresponding rows 177, 177' and 177'' on the chart, that is a slot, say 291, in one row 167 in each margin is arranged opposite say bunker 173 on the left hand line 177 on the chart, a slot, say 244 in the next row 168 on each margin is arranged opposite say bunker 174 on the centre line 177' on the chart, a slot 295 also in row 168 is arranged opposite green 171 also on the centre line 177' and a slot say 292 in the next row 169 is arranged opposite bunker 172 on the right hand line 177'' on the chart, and the arrangement is such that when a player has played his shot into a bunker or on to the green, one or other of rollers 163', 163'' or 163''' makes contact through a slot in the chart with plate 165 on the flap to close an electric circuit which functions in a manner yet to be described to prevent further progress by the player until a shot appropriately lofted to enable his ball to be extricated from a bunker or hazard is made, or, if he is on the green, a putt is correctly executed.

The fourth row of slots 170 and the fourth roller 163 co-operate in a similar manner to close a circuit through the second plate 166 on the flap 161 when the ball of a player is indicated as having landed so close to a bunker or hazard as to necessitate the execution of an approach or lofting shot. The lengths of these slots in the chart through which roller 163 projects are determined in accordance with the heights of the corresponding hazards, so as to determine the amount of loft required. In this case this circuit remains closed to prevent the balls progressing beyond the associated hazard unless a sufficiently lofted shot to clear the hazard has been executed.

When the ball is shown as having reached a green, say 171, it is necessary for the player to execute a putt. For this purpose a separate ball is used upon a separate putting surface such as is shown for example in Figs. 17 and 18. This surface may take the form of a long mat 178 of felt or carpet marked with distances as shown, and the end of the mat is connected with a wooden frame 179 which may be formed with an incline 180 to enable given putts to be executed with a shorter mat. A hole is formed as shown at 181 in the mat and frame and beneath it is carried a yielding mounted disc 182 adapted to be depressed by the weight of a free golf ball to close an electric circuit through contacts 183.

Preferably a wedge-shaped projection 184 is provided on the wall of the frame 179 behind the hole 181 so that a wrongly directed ball cannot rebound into the hole 181. It will of course be understood that the end of the putting surface may be open or may have any other convenient shape than that shown.

The switch 183 is connected electrically with the apparatus within cabinet 1 in such a manner as to counteract the effect of the contact of roller 163'' with plate 165 when a successful putt is executed and the arrangement is such that the indicator is moved to indicate the ball in position on the next tee.

The electrical circuits include a number of switches which are arranged upon a panel in the rear compartment 5, Fig. 2, and in the case illustrated, six groups of switches represented by C, D, E, F, G, and H in Fig. 14 are provided on the panel. In Fig. 15 is shown a convenient form of switch assembly whereby a number of circuits may be opened or closed by a single moving member, and which is well adapted for use in forming the various groups C, D, E, F, G and H. This switch assembly comprises a metal plate 98 having bent up, lugs 99, 105, 106 and 107, the lug 99 serving as anchorage for a magnet 113, lug 105 as anchorage for the spring mounted armature 111 and lugs 106 and 107 as anchorages for a series of switch blades 112 adapted to be deflected by a member 114 carried by the armature 111, when said armature is rocked, to open and close different circuits simultaneously. It will be understood that the switch assembly illustrated in Figs. 15 and 16 is merely by way of example, the contact blades 112 being varied in number and arrangement as required.

Preferably means are provided to prevent excessive rebound of the anchored ball 36 and for this purpose an extension cord 115 may be connected between a point on the anchorage cord 9 and a fixture 116 on the ground or floor arranged in alignment with the guide arm 58 of the direction turret.

The fixture 116 may also support a target or flag (not shown) at which the player may aim.

In use the direction turret may if desired be arranged outside the lower end of the cabinet, instead of inside as described above, whichever is convenient. The apparatus may be driven from a battery or alternatively from the mains through any convenient form of mains unit.

In the diagram (Fig. 14) the apparatus is shown as being driven from a battery.

The operation of the apparatus will now be described.

Before commencing to play, the chart 96 is adjusted by rotation of rollers 94, 95 by means of a hand knob 117 for example, shown in Fig. 1, to show a hole or holes of the course behind the transparent panel, and the carriers 69 are arranged in their fully lowered position. A main switch (not shown) is closed to connect the apparatus to the current supply derived from the battery 119.

The ball 36 is teed up in a position where it is in alignment with the guide arm 58 of the direction turret as shown in Fig. 1, and then struck by the first player who for the purpose of the present description will be assumed to be the player using the left hand carrier or indicator 69.

Assuming that the ball has been driven straight the arm 58 will remain substantially unmoved and the movable discs 40 and 54 of the direction turret will remain in the positions indicated in

Figs. 7, 8 and 14, but the pull of the ball on the cord 9 rotates the drum 8 (Figs. 3, 4 and 7) and tensions the spring 13. From the moment the cord 9 begins to unwind and the drum 8 to rotate, the pivoted levers 17 are moved by the travelling nut 16 on the screwed end 15 of drum spindle 10 about their common pivot, so that member 17' is moved to the left in Fig. 4 to close switch 109 and open switches 107 and 108 of group 20.

Referring to Fig. 14, switch 109 of group 20 being now closed, a circuit is completed from terminal 185 of battery 119, lead 186, switch 109, lead 187 and magnet 188 to the negative terminal of the battery which throughout the following description will be referred to as "earth". This magnet 188 is energized and switch group D operated.

Switch group D is of the kind illustrated in Figs. 15 and 16, magnet 188 being the equivalent of magnet 113 in the switch assembly shown in Figs. 15 and 16. In group D when magnet 188 is energized, the armature 189 is drawn to the left in Fig. 14, switches 190 and 191 are closed and switches 192, 193, and 194 are opened. By the closing of switch 190 the spindle 10 bearing the cord drum 8 and the governor spindle 24 are connected through lead 195, switch 196 of group H, lead 197 to the positive terminal 185 of the battery. The functions of switches 191, 192, 193 and 194 of group D will be described later.

When the cord 9 ceases to pull, the drum 8 with spindle 10 (Figs. 3, 4 and 7) commences to rotate in the reverse direction through the unwinding of the now tensioned spring 13 and the cord 9 is rewound. The spindle 10 through clutch device 21, 28 and 29 rotates worm gear 22 to drive the governor spindle 24.

The friction disc 31 of the governor moves longitudinally (upwards in Figs. 4 and 14) in the usual manner of a centrifugal governor to close the switch 32.

Thus the circuit, switch 190, lead 195, switch 196 of group H, lead 197, spindle 10, governor spindle 24, disc 31, switch 32, contact 41 on disc 40 of the direction turret, lead 198, switch 199 of switch group F, lead 200, left hand magnet 64, left hand lead 201, contact 202 of switch group G contact arm 203 to earth is closed. The left hand magnet 64 is therefore energized and the armature 65 moved to permit the left hand gravity motor to rotate.

It will be understood that at this time the right hand magnet 64 is not energized, the circuit thereof, which is similar to that described above in respect of the left hand magnet, being broken in view of the position of contact arm 203 of group G.

The left hand gravity motor now running permits the left hand carrier 69 to rise under the pull of its counterweight 78.

This movement continues until the cord 9 is completely rewound by the rotation of drum 8, and levers 17 have been returned to their normal position by the movement of nut 16 on the screwed end 15 of spindle 10.

In this position of levers 17 the switch 109 is opened, thus breaking the circuit of magnet 188 to open switch 190 of group D thereby breaking the circuit of left hand magnet 64 to stop the left hand gravity motor and therefore the movement of the left hand carrier 69.

At the same time that switch 190 is opened switch 194 is closed. As a result a circuit from terminal 204 of the battery 119 and including lead 205, lamp 70 in the left hand carrier 69,

lead 206, switch 194, switch 207 of group E, lead 208, contact 209 and arm 203 of group G is closed so that the left hand lamp 70 is illuminated. A spot of light from said lamp is projected on to the mirror 72 on the bracket 73 on the left hand carrier 69 by the corresponding optical system 71 and reflected by said mirror on to the chart 96 to afford an indication of the point on the course reached by the ball as a result of the stroke. At the same time the corresponding arrow shaped aperture 74 is illuminated by the same lamp 70 to facilitate the reading of the distance from the scale on the edge of the chart.

When play was about to commence the switch 193 of group D was closed as shown in Fig. 14, and thus a closed circuit including said switch 193, switch 210 of group E, lead 211, switch 88 on the right hand carrier 69 and lead 212 served to maintain magnet 213 of switch group G energized and the arm 203 in the position shown. As left hand carrier 69 commenced to rise the pin 91 on the bracket 73 connected thereto engaged the cam 90 (Figs. 10 and 13) to move it about its pivot thereby opening switch 88. Although this switch 88 is opened however, the magnet 213 remains energized by current flowing through the circuit which includes switch 191 of group D and switch 214 of group G. This condition remains until switch 191 is opened through the opening of drum controlled switch 109 as the drum 8 comes to rest as described above.

When the cord drum 8 and the left hand carrier 69 come to rest switches 88 and 191 both being open, magnet 213 is de-energized and the arm 203 swings over to the right in Fig. 14. As a consequence a circuit including terminal 204 of the battery, lead 215, right hand lamp 89, contact 216 and arm 203 to earth is closed, and the right hand lamp 89 is illuminated to indicate that the second player corresponding to the right hand side of the machine is due next to play.

At the same time arm 203 connects with contact 217 so that the controlling magnet 64 for the right hand gravity motor is made capable of being energized on the next stroke.

A stroke by the second or right hand player if straight will operate the right hand magnet 64 to release the right hand carrier in the same manner as described above with reference to the left hand carrier through corresponding circuits, and when said second or right hand carrier comes to rest the right hand carrier lamp 70 is illuminated through a closed circuit comprising battery terminal 204, leads S and 205, right hand lamp 70, lead 206, lead 208, switch 207 of group E, switch 194 of group G, contact 218 and contact arm 203 of group G to earth. The second player will therefore be afforded an indication of the strength of the stroke he has made, in a manner similar to that described above with reference to the first or left hand player.

If the movement of the right hand carrier 69 is sufficient to pass left hand carrier 69, switch 88 on the right hand carrier will be closed and when in due course i. e. when the carrier 69 comes to rest switch 193 of group D is closed, magnet 213 will again be energized to return arm 203 of group G to the position shown in Fig. 14. In these circumstances the left hand indicating lamp 89 will be illuminated to indicate that the left hand player is next to play.

If on the other hand the right hand carrier 69 does not move far enough to pass the left hand carrier 69 switch 88 remains open and arm 203 remains swung over to the right and the right

hand lamp 89 is illuminated to indicate that right hand player is to play again.

The means for indicating any lateral deflection in the flight of the ball when struck will now be described.

Assuming for example that the parts are set as shown in Fig. 14 and the first or left hand player is about to take a stroke. If when the ball is struck it is deflected to one side or the other, the guide arm 58 will be correspondingly moved and the horizontal disc 40 (Figs. 7, 8 and 14) will be rotated about its vertical axis. If the deflection is not excessive, switch 109 and switch groups D and G operate, and the left hand carrier 69 moves, in precisely the same manner as previously described.

Assuming that the lateral deviation of the stroke from the straight is such as to rotate disc 40 to a small extent in a clockwise direction in Figs. 8 and 14 contact 45 on disc 40 engages with spring contact 46.

Thereby connection is made from terminal 185 of the battery, switch 190, switch 219 of group E, lead 220, contact arm 46, contact 45 and lead 221 to magnet 83 shown more fully in Fig. 12 and which is arranged to rock armature 81 and the lever system connected thereto and the square section shaft 76 controlling the angular movement of mirror 72. The circuit of magnet 83 is not completed however until the armature 84 forming the locking device for the lever system 79, 80, 81 makes contact with a contact 222 (Fig. 14). This movement of the armature 84 to close the circuit of magnet 83 takes place when magnet 223 is energized by the closing of switch 107 of group 20 when the cord drum 8 is about to come to rest with the cord rewound.

The switch 107 and the magnet 223 controlling armature 84 are contained in a circuit which includes point 225 in lead 201, magnet 223, lead 226, switch 107, lead 224 and point 227 in lead 200.

While magnet 64 is energized a potential difference exists between the points 225 and 227 thus causing current to flow in the above described circuit controlling magnet 223.

Movement of the armature 84 having released the armature 81 and the lever system 79 and 80 connected therewith for movement under the pull of now energized magnet 83 the left hand square section shaft 76 is as a consequence rocked to rock the corresponding mirror 72 to thereby direct the light spot on to a point on the chart which will afford an indication of the lateral deflection as well as the strength of the stroke. From the above description however, it will be understood that the rocking movement of the mirror 72 is delayed until the travel of carrier 69 is almost completed.

It will be understood that if the disc 40 is rotated in the reverse direction due to an opposite deflection of the ball, direction contact 44 engages contact strip 46 to control the opposite magnet 82 through lead 228, but in a similar manner to that described above in connection with magnet 83, to afford the appropriate indication of deflection in conjunction with the indication of strength due to movement of the carriage 69.

A similar set of magnets and circuits is provided as shown for use in connection with the right hand carrier 69.

If a stroke is made by a player with excessive lateral deflection such that third contact 41 on disc 40 moves entirely away from contact strip 42 the circuit containing the gravity motor controlling magnet is broken so that no movement of

the carrier 69 takes place and no indication of any advance is afforded.

The operation of the apparatus whereby the skill of the player in extricating his ball from, or avoiding, hazards such as bunkers 172, 173 etc. will now be described.

Assuming that the left hand player is shown to have played his ball into bunker 174 on the centre line 177' of the course. Then in this position roller 163'' will make contact through aperture 244 provided in the margin of the chart opposite said bunker, with plate 165 on the flap 161 on the left hand carrier 69 and roller 163 will make contact through a corresponding aperture 170 with plate 166 on the same flap. The contact of roller 163'' and plate 165 closes a circuit comprising contact arm 203 and contact 245 of group G, lead 246, contact arm 232, contact 230 on the end of armature 81, roller 163'', plate 165, lead 247, switch 158'' on disc 54 of the direction turret, lead 248, magnet 249 of group F, lead 250, switch 192 of group D to terminal 185 of battery 119.

Contact of roller 163 with plate 166 closes a circuit comprising contact arm 203 and contact 234 of group G, lead 235, roller 163, plate 166, lead 236, contact 158' on disc 54 of the direction turret, lead 237, magnet 238 of group C, contact 192 of group D to terminal 185 of battery 119.

The magnet 249 (group F) being energized will prevent closure of the circuit containing the magnet 64 for releasing the left hand carrier 69 to run, since switch 199 which is in the circuit including magnet 64 is now open.

When the player strikes the ball, whether sufficiently lofted or not, the switch 192 (group D) which is in the circuit containing magnets 249 and 238 will be opened through energization of magnet 188 as described above. In order however, that these magnets shall remain energized to prevent movement of the carrier 69 unless sufficient loft is imparted to the ball, switches 255 in group F and 242 in group C are provided, the latter connecting lead 239 direct to the terminal 185 of the battery and the former connecting lead 239 to the battery by way of lead 195 and switch 190 which is now closed.

In order that the carrier 69 may move or in other words in order that the ball may be played out of the bunker magnet 249 must be de-energized to permit switch 199 in the circuit of magnet 64 controlling the movement of carrier 69, to close.

When the stroke is made and the ball lofted, arm 58 will be tilted upwards and disc 54 of the direction turret moved counterclockwise.

If the loft imparted to the ball is only sufficient to open switch 158', magnets 238 and 249 will remain energized for the reason that a circuit comprising terminal 185 of battery 119, switch 242 of group C, lead 239, magnet 238, lead 237, lead 251, switch 158'', lead 252, switch 241 of group C lead 253, switch 254 of group F to earth remains closed. Even though sufficient loft is imparted to open switch 158'', again magnet 238 will remain energized through the same circuit, and magnet 249 also is energized through a closed circuit including lead 247, which is earthed through plate 165, switch 243 of group C, lead 248, magnet 249, lead 250, switch 242 of group C to terminal 185 of the battery 119.

If sufficient loft is imparted to the ball to open all the switches 158' and 158'' and 158'', the circuit described above with reference to switch 158' is now opened, magnet 238 is therefore de-energized resulting in de-energization of

magnet 249 and therefore the closing of switch 199 and the carrier 69 is freed to run to indicate that the ball has been played out of the bunker.

Since a lofted ball cannot travel for so great a distance for a given strength of blow as a normal shot, means are provided to limit the extent of movement of the carriage when a lofted shot is played.

Such means comprise the intermittent contact device 154, 155, 156 described above as being provided in conjunction with the drum spindle 10.

Before the lofting shot is executed, magnet 249 being energized, switch 258 of group F is closed whereby magnet 260 is energized through lead 259 and switches 261 and 262 are closed and switch 196 opened. Magnet 260 also remains energized, after magnet 249 is de-energized, through a closed circuit comprising switch 190 of group D, lead 195, switch 262, magnet 260 to earth.

The opening of switch 196 disconnects spindle 10 from the circuit containing the magnet 64 controlling the carrier. In these circumstances the circuit containing magnet 64 is made only intermittently through contact arm 156 and the metallic insert 155 electrically connected with spindle 10, the arm 156 being connected to the terminal 185 of the battery 119 by way of lead 186 switch 109 (now closed) and lead 263 and thus the distance travelled by the carrier 69 is reduced.

The energization of magnet 260 which as stated above takes place when the ball enters the bunkers is also utilized to close a switch 261 which is in circuit with a warning lamp 265, Fig. 14, preferably coloured, to light said lamp to indicate to the player that he is in a hazard.

As stated above three rollers 163', 163'' and 163''' and three rows of hazards are provided for each player.

In the above described example the player is assumed to have played his ball into a hazard i. e. bunker 174 on the centre line 177' of the course. It will be understood that the hazard mechanism described will operate in a similar manner to that described when the ball has entered a bunker on one or other of lines 177 or 177'' on the course, since where a stroke with lateral deviation has been made, armature 81 will have rocked and one or other of two side contacts 229 or 231 on the end of said armature will have contacted with arm 232 so that only the corresponding roller 163' or 163'' will be in circuit.

If the player has played his ball to a position in front of a bunker it is still necessary to loft the ball to clear that bunker, otherwise the ball will enter the bunker and the requirements and operations will then be the same as just described.

When the ball has landed in front of, but not in a bunker, for example the bunker 174 previously considered, the roller 163 will make contact with plate 166 through the longer slot of row 170, opposite bunker 174.

In these circumstances the next shot by that player must be a shot lofted sufficiently to pass over the bunker and if the shot is not sufficiently lofted, the ball will be indicated as having entered the bunker, in which case the operation of the apparatus in getting out of the bunker will of course be the same as described above.

Before the shot however, the roller 163 being in contact with plate 166, the circuit described above including magnet 238 and switch 158' on disc 54

of the direction turret is closed. If the ball is not lofted sufficiently to tilt arm 58 and rotate disc 54 so far as to open switch 158', then as the carriage 69 moves upwards and roller 163'' opposite the same bunker contacts plate 165 through the appropriate slot in the chart, the circuit including magnet 249 and switch 158'' is closed, and switch 199 of group F is opened, thereby stopping the movement of the carriage and the ball will be indicated as in the bunker.

If the shot is sufficiently lofted to tilt arm 58 and to rotate disc 54 to open switch 158' then the circuit including magnet 249 is not closed and movement of the carriage can therefore proceed until the cord is rewound as originally described.

In case it is desired to move the carriage by hand for any reason, for example in order to move the ball from a bunker, a switch 266 is provided for the purpose of connecting the magnet 64 controlling the movement of the carrier 69 directly to the battery by way of terminal 185 of the battery, lead 269, switch 266 and leads 268 and 200, magnet 64 and lead 201.

If a ball is shown as having reached a green, for example green 171, all the rollers 163', 163'' and 163''' will be contacting with plate 165 so that magnet 249 is energized and switches 199 and 269 of group F are opened and closed respectively, and it is now necessary in order that the player of that ball can proceed, to use a separate free ball to execute a putting shot on the separate putting table 178.

Assuming that the putt is successfully made, switch 183 on the putting table is closed. Thereby a circuit comprising terminal 185 of the battery 199, lead 270, switch 183, lead 271, switch 269 of group F, lead 200, magnet 64 controlling the carrier 69, lead 201, contact 202 and contact arm 203 of group G to earth is closed.

The carrier 69 therefore moves upwards and this movement continues until roller 163'' emerges from long slot 168, thereby breaking the hitherto closed circuit containing magnet 249. This results in the opening of switch 269 and cessation of movement of the carrier.

The arrangement is such that the ball will be shown as having been transferred to the next tee. This of course is determined by the length of slot 295.

It is essential however, that the movement of the carrier 69 shall not be interrupted until the ball is indicated as having reached the next tee and also that the change of lights to indicate the next player's turn shall not be effected until the carrier comes to a standstill. In other words the circuit including magnet 64 must not be broken and therefore magnet 213 must remain either energized or de-energized according to its original condition.

For this purpose when the free ball closes switch 183 on the putting table 178, magnet 275 of group E is energized thus closing switches 273 and 274 and opening switches 207, 210 and 219. Thenceforth magnet 275 is maintained energized through switches 258 of group F and 274 of group E which are both closed and this circuit cannot be broken until roller 163'' moves from slot 295 to de-energize magnet 249 and open switch 258 in the above circuit to magnet 275.

During the movement of the carrier 69, the switch 88 will be operated, but switch 210 being open, the condition of magnet 213 will not be changed and no lighting of either lamp 89 will be effected.

If magnet 213 was originally energized it will

continue to derive current through switch 273 of group E and 214 of group G.

If however the magnet 213 was originally de-energized switch 214 will of course be open.

Thus, should the free ball be removed from the putting table 178 before the carrier 69 has come to rest magnet 275 remains energized to prevent magnet 213 from being changed, so that the carrier 69 continues to move and the change over lamps 89 are not yet operated.

If the free ball is allowed to remain in the hole on the putting table to maintain switch 183 closed, then again magnet 275 will remain energized and prevent magnet 213 from being changed so that no change of the lights 89 takes place until the free ball is removed and the putting table 178 made ready for the next player.

When magnet 275 is excited, switch 219 is opened and the circuit to either of the lateral deflection magnets 82 or 83 is broken. If therefore the player's ball prior to the putting shot was on the green at one side or the other of the centre line of the course the corresponding deflection magnet 82 or 83 will be de-energized and armature 81 will return to its central position so that the circuit to centre roller 163 through the long slot 295 in the chart, to plate 165 is made, this condition being necessary to the carrying out of any putting shot if the ball is to be shown as having reached the next tee.

The apparatus is such that even if, in the course of play, a very feeble blow is imparted to the ball 36, an indication will appear on the chart. To this end the governor spindle 24 is, as stated above, arranged to make a small longitudinal movement (upwards in Figs. 4 and 14) when first moved by worm gear 22 even though no rotation of the governor takes place.

This longitudinal movement results in the governor disc 31 engaging the lower of the two contacts of switch 32 without however closing the switch. Switch 108 being in parallel with the two contacts of switch 32 and remaining closed owing to the slight movement only of drum 8, the circuit to the magnet 64 controlling the gravity motor is momentarily closed in the same way as described above in connection with a normal stroke, and the carrier 69 makes a movement of very small extent.

For such small movements of the drum 8 the swing of the levers 17 is insufficient to open switches 107 and 108 but is sufficient to close the normally open switch 109 in order to energize magnet 188 which is a necessary preliminary to the energization of a magnet 64 controlling one of the gravity motors 61.

If during the movement of carrier 69, rewinding of the cord and rotation of the drum 8 should be interrupted, for example through the ball meeting an obstruction or the cord being trodden upon, the governor 24 will be brought to a standstill, disc 31 will move longitudinally downwards and switch 32 will be opened to break the circuit of magnet 64 controlling the gravity motor so that movement of the carrier ceases. This occurs of course only when the cord is still sufficiently unwound for switch 106 to be open.

The two spots of light 70a projected on to the chart may be of different colours, say red and white respectively, so that each player can readily recognize his own spot.

A switch 274 is provided to enable one person to play by himself, the switch 274 being in parallel with switch 88 on the bracket 73 attached to the right hand carrier 69 so that the change over

arrangement affecting switch group G may be cut out, the player playing continuously with the left hand part of the apparatus.

We claim:—

1. An apparatus for playing a ball game comprising a ball, means to limit the flight of the ball when struck, a chart bearing a representation of a golf course and including hazards, an indicator movable with regard to said chart to indicate progress of the game over the course, means to move said indicator in accordance with the force, and vertical loft imparted to the ball, means on the chart adapted to co-operate with the moving indicator to make a contact in an electric circuit when the indicator reaches a given position with respect to a representation of a hazard on the chart and means controlled by said circuit to prevent further progressive movement of the indicator until sufficient loft is imparted to the ball to extricate it from the hazard.

2. An apparatus for playing a ball game comprising a chart bearing a representation of a golf course with hazards, a series of slots formed in the chart in positions corresponding to the positions of the hazards, an indicator movable with regard to the chart to indicate progress of the game over the course, a series of electrical contacts carried by the indicator and each adapted to close an electric circuit when brought by movement of the indicator into register with a slot in the chart, means controlled by said contacts to prevent movement of the indicator to remove said contact from the slot in the chart until a loft has been imparted to the ball.

3. An apparatus for playing a ball game comprising a ball anchored to a movable cord, a movable guide arm through which said cord passes, an indicator, means controlled by the movements of said guide arm to move the indicator in accordance with the force, lateral deflection, vertical loft imparted to the ball and means to limit the movement of the indicator when insufficient loft is imparted to the ball and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

4. An apparatus for playing a ball game, comprising means to limit the flight of the ball, an indicator, and a direction turret including a member adapted to be moved about a vertical axis by lateral deflection imparted to the ball by a player and a member adapted to be moved about a horizontal axis by the vertical loft imparted to the ball by a player, electrical means adapted, under the control of said movable members to control the movements of the indicator to afford an indication of the progress of the game, means to limit the movement of the indicator when insufficient loft is imparted to the ball and electrical means adapted, in a given predetermined position of the indicator, to set said limiting means.

5. An apparatus for playing a ball game comprising means to limit the flight of the ball, a slotted chart, an indicator adapted to be moved relatively to the chart to afford an indication of the progress of the game, a series of rollers carried by the indicator and adapted to project through the slots in the chart in given positions of the indicator, flaps on said indicator adapted to be engaged by rollers projecting through the slots in the chart to close electrical circuits and means controlled by said electrical circuits to prevent movement of the indicator from pre-determined positions until a pre-determined loft is imparted to the ball.

6. An apparatus for playing a ball game, comprising means to limit the flight of the ball when struck by a player, an indicator, means for operating said indicator in accordance with the force of the blow imparted to the ball, means adapted to be set to limit the operation of said indicator until a stroke is made which imparts a required predetermined loft to the ball, and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

7. An apparatus for playing a ball game, comprising means to limit the flight of the ball when struck by a player, an indicator, means for operating said indicator in accordance with the force and the lateral deflection of the blow imparted to the ball, means adapted to be set to limit the operation of said indicator until a stroke is made which imparts a required predetermined loft to the ball, and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

8. An apparatus for playing a ball game, comprising means to limit the flight of the ball when struck by a player, an indicator, means for operating said indicator in accordance with the force, lateral deflection and vertical loft imparted to the ball, means adapted to be set to limit the operation of said indicator until a stroke is made which imparts a required predetermined loft to the ball, and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

9. An apparatus for playing a ball game, comprising a rotatable drum, a ball anchored by a cord to said drum, said cord being adapted to be wound on said drum and unwound therefrom when the ball is struck by a player, an indicator operable under the control of said rotatable drum, means adapted to be set to limit the operation of said indicator until a stroke is made which imparts a required predetermined loft to the ball, and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

10. An apparatus for playing a ball game, comprising means to limit the flight of the ball when struck by a player, an indicator, means for operating said indicator when a loft is imparted to the ball by the player, means adapted to be set to limit operation of said indicator until a stroke is made which imparts the required predetermined loft to the ball, and means adapted to automatically set said limiting means upon a given predetermined indication appearing at the indicator.

11. Apparatus for playing a ball game comprising a ball, means to limit the flight of the ball when struck, an indicator, a putting surface and a target on the putting surface, means controlled by the flight limiting means adapted to operate the indicator in accordance with the force of a blow imparted to the ball, control means mounted adjacent to the target for operation by a ball striking the target and adapted to control operation of said indicator, and means for transferring the control of the indicator from the

flight limiting means to said control means, when a given predetermined indication appears on the indicator.

12. Apparatus for playing a ball game comprising means to limit the flight of a ball, an indicator, a putting surface and a target on the putting surface, means controlled by the flight limiting means adapted to operate the indicator in accordance with the force of a blow imparted to the ball, control means mounted adjacent to the target and operable by a ball striking the target when a successful putt is executed and means to bring the indicator under the influence of said control means when a predetermined indication appears on the indicator.

13. Apparatus for playing a ball game comprising a ball, means to limit the flight of the ball when struck by a player, a chart bearing a representation of a golf course and including a green, an indicator movable over said chart to indicate progress of the game, electrical means controlled by the flight limiting means to determine the extent of the movement of the indicator in accordance with the force of a blow imparted to the ball, a putting surface, a target on said putting surface, electrical controlling means mounted adjacent to the target and operable by a ball striking the target and adapted to cause operation of the indicator when a successful putt is executed, and means on the chart adapted to co-operate with the moving indicator to set the electrical controlling means adjacent to the target for operation, when an indication appears of a ball on the green on the chart.

14. An apparatus for playing a ball game comprising a ball, means to limit the flight of the ball when struck, a chart bearing a representation of a golf course, including hazards, an indicator movable with regard to said chart to indicate progress of the game over the course, means to move said indicator in accordance with the force of a blow imparted to the ball, means on the chart adapted to co-operate with the moving indicator to make contacts in electric circuits when the indicator reaches a given position with respect to the representation on the chart of a hazard, means controlled by one of said contacts to prevent movement of the indicator past the representation of a hazard until sufficient loft is imparted to the ball to pass it over such a hazard and means controlled by another of said contacts to cause the indicator to move to represent the ball as in a hazard when a stroke is made imparting insufficient loft to the ball to pass it over such a hazard.

15. An apparatus for playing a ball game comprising means to limit the flight of the ball, a chart, an indicator, means adapted to move said indicator at a constant speed relatively to said chart and for a period which is determined in accordance with the force of the blow imparted to the ball, and means adapted to reduce the distance travelled by the indicator under the force of the blow when a vertical loft is imparted to the ball.

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