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M. R. SPEISER

3,300,218

GOLF BALL IMAGE PROJECTING SYSTEM FOR GOLF GAMES

Filed Dec. 23, 1963

3 Sheets-Sheet 1

Fig. 1

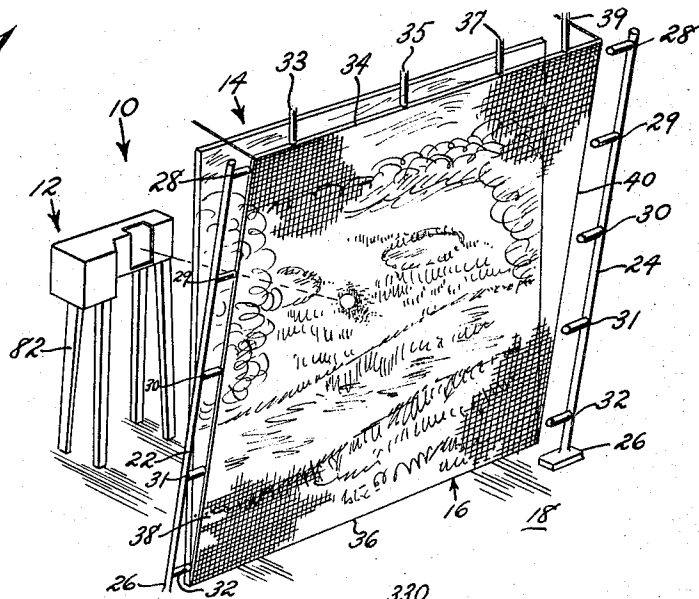


Fig. 5

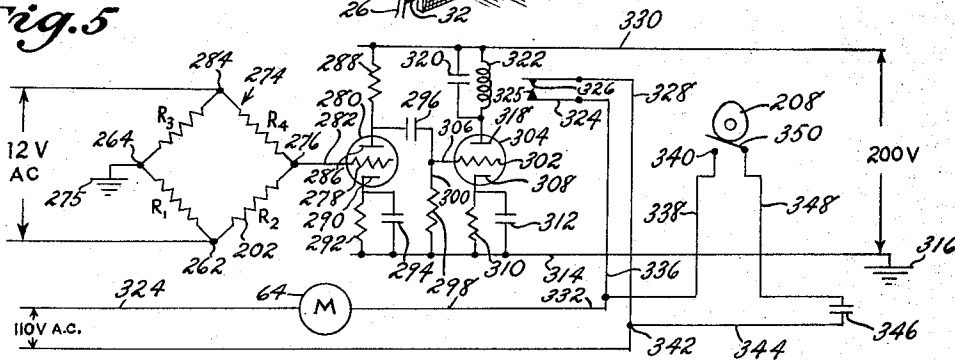
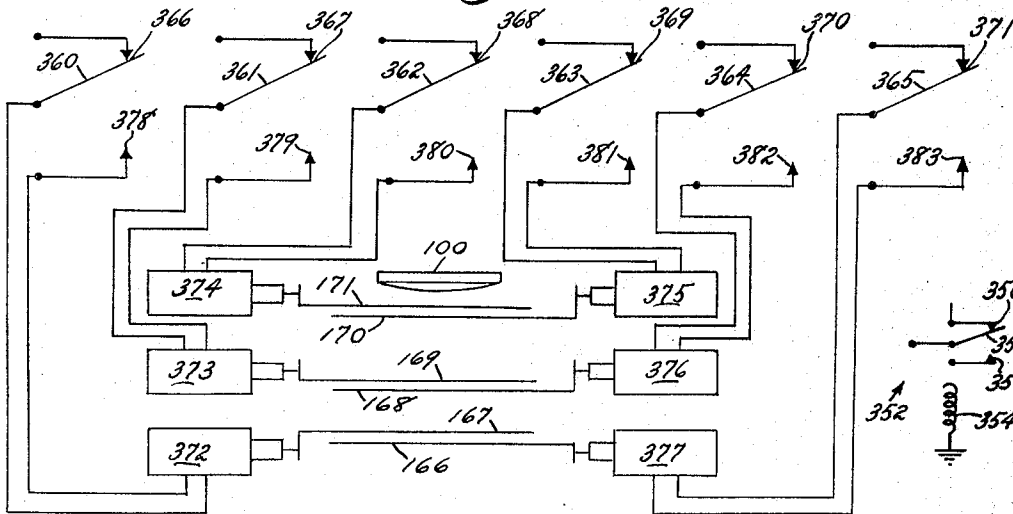


Fig. 6



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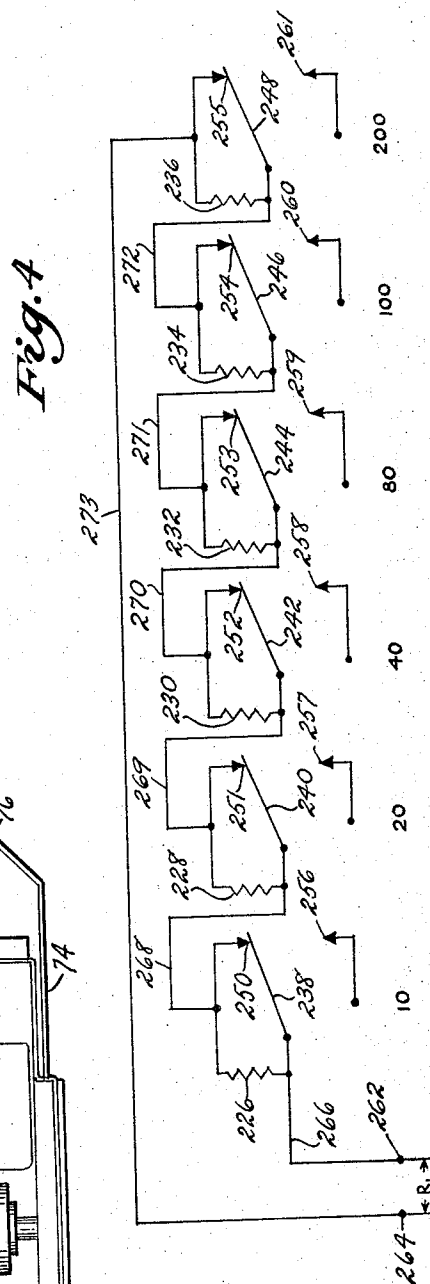
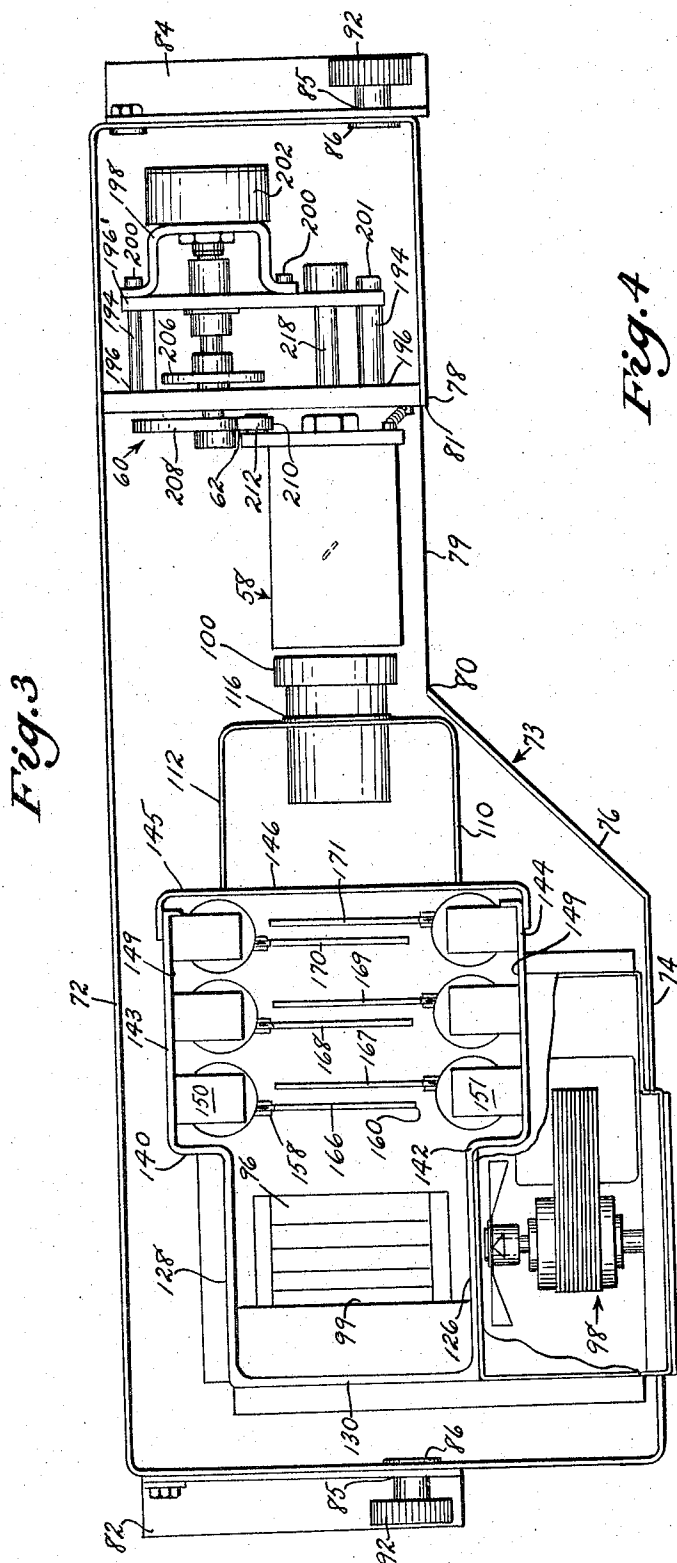
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Fig. 2

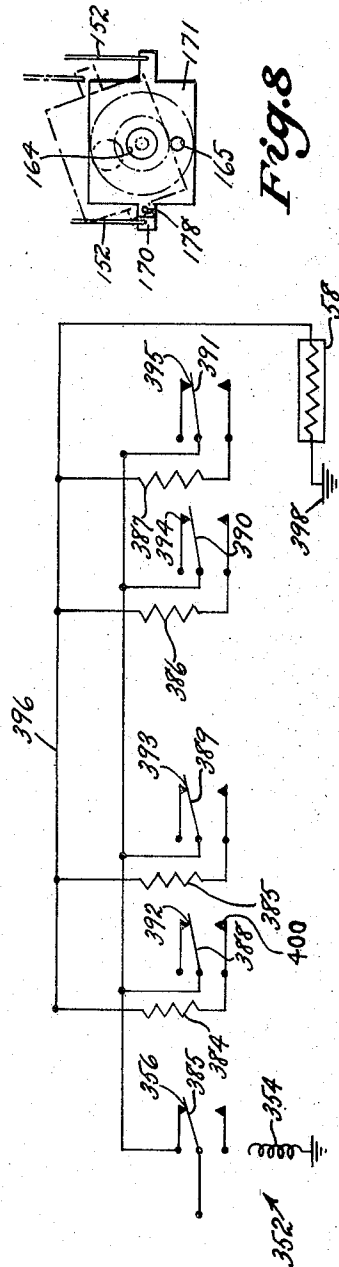
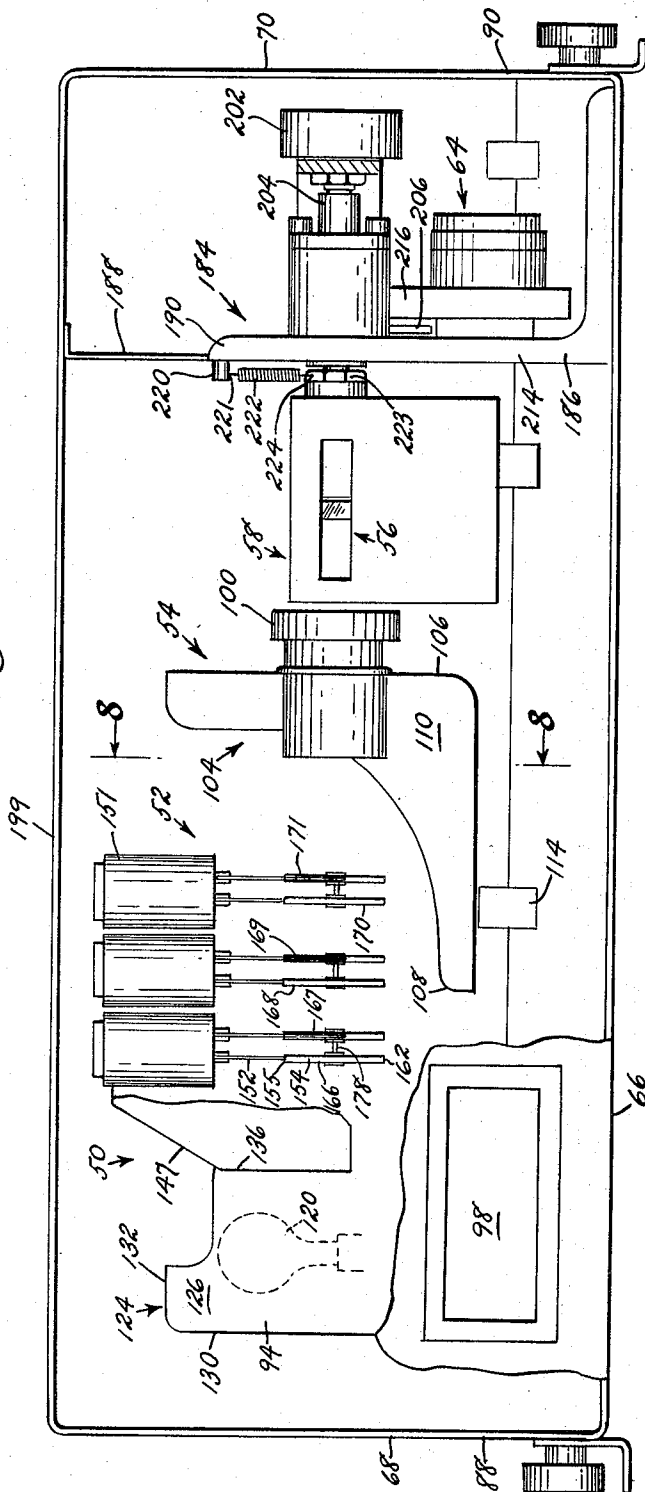
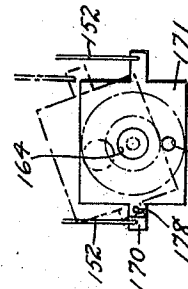


Fig. 7

Fig. 8



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3,300,218
**GOLF BALL IMAGE PROJECTING SYSTEM
FOR GOLF GAMES**
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New York, N.Y. 10023
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5 Claims. (Cl. 273—185)

This invention relates generally to the field of amusement devices, and more particularly to an improvement in the simulated golf driving range claimed in U.S. Patent No. 3,091,466, suitable for use in amusement parks, arcades and similar installations where considerations of space make the installation of an actual driving range impractical. Devices of this type are generally known in the art, and the invention lies in the specific improvement means for providing a moving projected simulative golf ball image which may be installed on the present construction at a markedly reduced cost.

In devices of the prior art, complicated analogue computer devices have been employed to combine factors involving initial and final velocities of the driven ball, degree of spin imparted to the ball, and the angle of initial flight to arrive at a probable estimated range and ultimate location of the ball at the completion of the flight. This complex data may be further employed as signals to a scanning projector device which can then cast a nimage of a simulative golf ball upon the painted backdrop of a golf green, or upon a projected image of a golf green as utilized in later constructions.

Accordingly, it is among the principal objects of the present invention to provide an improved scanning projector of the class described which may perform a reasonably accurate simulation of the final part of the trajectory of a golf ball utilizing input signals from the presently available computer equipment.

Another object of the invention lies in the provision of a device of the class described in which the simulative golf ball image is sized in accordance with the computed length of the drive.

Still another object of the invention lies in the provision of a device of the class described in which the player may see the actual simulated completion of the golf drive in approximately the same time sequence as would have elapsed under actual play conditions.

A still further object of the present invention lies in the provision of a device of the character described in which the scanning projector is positioned horizontally according to the horizontal input signal received from an existing computer.

Yet another object of the invention lies in the provision of a device of the class described in which the vertical movement of the image upon the screen commences at the top of the screen and travels down into the picture, stopping at the approximate location of the projected point of ball impact.

Still another object of the invention lies in the provision of a device of the class described in which the cost of fabrication may be of a reasonably low order, with consequent wide sale, distribution and use.

A feature of the invention lies in the provision of means to automatically reposition the scanning projector after each drive is completed.

These objects and features, as well as other incidental

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ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claims.

In the drawings, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is a perspective view showing a portion of a golf driving range screen, with the scanning projector in position behind the screen, and throwing a simulative image of a golf ball in a vertical path of movement.

FIGURE 2 is a side elevational view of the scanning projector, partly broken away to show detail.

FIGURE 3 is a top plan view thereof, partly broken away.

FIGURE 4 is a schematic view of relays driven by the additive counter unit.

FIGURE 5 is a schematic view of the circuits for the vertical positioning of the scanning projector.

FIGURE 6 is a schematic view of the mask selector circuit.

FIGURE 7 is a schematic view of the horizontal positioning of the scanning system.

FIGURE 8 is a front elevational view of the image sizing masks.

In accordance with a preferred embodiment of the invention, the device, generally indicated by the reference character 10, comprises broadly: a scanning projector 12 and associated circuitry to be used in conjunction with a screen 14, an impact net 16, and a computer (not shown, the details of which are disclosed in my prior Patent No. 3,091,466.

More particularly there are shown left and right supporting stanchions 22 and 24 having lower portions 26 secured to a floor or other horizontal surface 18. Positioned along the length of the stanchions are photocell units 28, 29, 30, 31 and 32.

The net 16 is bounded by an upper edge 34, a lower edge 36, a left side edge 38, and a right side edge 40. Secured to the upper edge 34 of the impact net 16 are horizontally positioned signal cords 33, 35, 37 and 39 which are connected to switches (not shown) which in turn signal the computer element as more fully described in Patent No. 3,091,466, mentioned above.

The scanning projector 12 (FIGURES 2 and 3) includes a projector unit 50, a masking unit 52, a lens element 54, a mirror 56, a galvanometer 58, a cam 60 and a cam follower 62, and a motor 64.

The scanning projector 12 is encased by a bottom wall 66, a rear wall 68, a front wall 70 and a left side wall 72. The right side wall 73 includes a rear portion 74, a centrally and angularly disposed portion 76 and a forward portion 78. An aperture 79 is defined in the forward portion 78, being bounded by left edge 80 and right edge 81. The scanning projector may also have a top wall 199 in which there is also a continuation of aperture 79.

The scanning projector element 12 may be either supported by legs 82, as illustrated, or may be bolted directly to the driving location platform 18.

The projector unit 50 includes a light source 94 having a vented wall 96 thereabove to allow the heat generated by the light source 94 to escape into the ambient air. Located to one side of the light source is a blower assembly 98 which further aids in the dissipation of the heat

generated by the light source 94. The light source is provided with a reflecting mirror 99 located to its rear, and directing the light in a line path towards the forward portion of the projector, as is well-known in the art.

Interposed in the path of the aligned light is a masking element 52 and a projection lens 100, the focal plane of which lies within the masking element, both being supported by a base member 104 which includes a forward wall 106, a rear wall 108, a right side wall 110 and a left side wall 112. The base member 104 is supported upon and secured to an angle iron 114. The base member also has an aperture 116 having a diameter slightly larger than that of the lens and forming a firm, rotational fit therewith.

The light source 94 comprises a light bulb 120 surrounded by a hood member 124 which includes a right side wall 126, a left side wall 128 and a rear wall 130. The reflecting mirror 99 has a top wall 132 disposed thereover. Extending outwardly from the top wall is the louvered top wall 96. The front wall extends upwardly for only a short distance, the front wall, right side wall 126 and left side wall 128 defining an aperture 136 through which the light is directed from the light bulb 120.

The left and right walls 128 and 126 extend beyond the light source forming right and left panels 140 and 142, extending to form right and left side walls 143 and 144. The side walls are enclosed by a front panel 145 having an aperture 146 to allow passage of the directed light. The upper portions of the panels 140, 142 are inclined upwardly from the rear to the front and have an angularly disposed top panel 147 mounted thereon to provide additional screening protection.

Mounted along the inner surfaces 149 of the side walls 143 and 144 are six brackets 150 having solenoids 151 supported therein. The solenoid armatures 152 depend downwardly therefrom and are each pivotally secured to one of a plurality of masks 166, 167, 168, 169, 170, 171, respectively, by any well-known means. Each mask is bounded by an upper edge 155, a left side edge 158, a right side edge 160 and a bottom edge 162. Located in each mask are a large centrally located aperture 164 and a smaller selectively sized aperture 165. The apertures 165 are sized to correspond to a preselectively sized image to appear upon the screen in accordance with the computed distance of the drive of the player. Mask 171 is provided only with a large aperture for a purpose hereinafter appearing.

All the masks 166-171, inclusive, are pivotally mounted at a lower corner farthest from the solenoid arms, by means of a pintle 178. The solenoid armature 152 is also pivotally connected to the masks opposite the pintle 178.

An image-projecting unit 184 is located forwardly of the lens 100 and is supported by a base support member 186 which is secured to the bottom wall 66 of the scanning projector element 12. The member 186 is itself maintained in position by means of an angle iron support 188 which is welded or otherwise secured to the top wall 199 and the upper portion 190 of the base support. Extending outwardly from the member 186 in a direction away from the lens element 100 is a post 194 which is secured to a counterbore 196 located in the upper portion 190 of the support member 186. Extending outwardly in a similar fashion on the other side of the member 186, closer to forward portion 78 of side wall 73, is another post 194 similarly secured into the support member 186 through a counterbore 196. Affixed to the two posts 194 is a plate 196', which carries a member 198 secured to both the left-hand post 194 and the plate 197 by screws 200. A screw 201 secures the plate 196' to the right-hand post 194. Upwardly mounted upon the bracket member is a potentiometer 202. Extending outwardly therefrom is a shaft 204, extending through apertures in both the member 198 and the plate 196' and

having mounted thereupon a gear 206. The shaft 204 also extends through an aperture in the base support member 186 and has mounted on the end thereof a cam hub 208 with a corresponding cam follower 210 in abutting position thereto. The cam follower is mounted on a link 212 which is connected to the galvanometer 58.

Mounted to the lower portion 214 of the support member 186 is the motor 64 which drives the gear 206 through the reduction gear train 216.

A shaft 218 passes through apertures in the plate 196' and the member 186 and is affixed to the galvanometer 58 in such manner as to allow vertical rotational movement around the longitudinal axis of the link shaft 218. Mounted on the upper portion 190 of the member 186 proximate to the side wall forward portion 78 is a post 220 having an aperture 221 therein. A spring 222 is secured to the post 220 through the aperture and is further secured to the bushing 223 through aperture 224. The spring 222 provides the necessary tension to maintain the cam follower 210, and hence the meter 58 in proper abutting position against the cam hub 208.

Turning to a consideration of the electrical circuitry for operation of the scanning projector 12, electrical signals are received from the binary computer which is used in the present construction. The computer supplies a first input signal which is the horizontal signal received from the microswitches activated by detection from cords 33, 35, 37 or 39. The computer also provides a second input signal, which by means of the photocell units 28, 29, 30, 31 and 32 and associated computer circuitry computes the approximate yardage of the golf drive. For purposes of this specification, the second input signal will be referred to as the vertical signal. The operation of the circuitry activated by the vertical signal will be considered first.

Referring to FIGURE 4, there is shown a typical additive resistor circuit containing six resistors. Resistors 226 is related to ten yards of distance of a golf drive. In a similar vein, resistor 228 is analogous to a twenty-yard distance, resistor 230 is analogous to forty yards, resistor 232 to eighty yards, resistor 234 to one hundred yards, and resistor 236 to two hundred yards. In a combination of additive circuits, golf drives ranging in distance from ten yards to four hundred and fifty yards may be simulated by this circuit. For example, if the computer concludes that a golf drive having a projected distance of two hundred thirty yards is made, the computed vertical signal would activate resistors 226, 228 and 236. Activation is accomplished by solenoid activation of the switches 238, 240, 242, 244, 246 and 248, respectively. In an open position these switches bear against contact points 250, 251, 252, 253, 254 and 255. Oppositely disposed are open contact points 256, 257, 258, 259, 260 and 261. The purpose of this circuit is to provide an output resistance R1 as measured between the contacts 262 and 264. The open position as shown in solid lines in FIGURE 4 illustrates a circuit having no resistances, since there is a resistance free-path for the current, namely along conductor 266 through the switch 238 and contact point 250 into the next conductor 268, thus bypassing the resistor 226. All of the corresponding switches and resistances are connected in parallel across respective conductors 269, 270, 271, 272 and 273, which also are connected to the contact 264.

Returning to the above example, the vertical input signal from the computer would cause the switches 238, 240 and 248 to break contact with points 250, 251 and 255, and 261. The current path from contact 262 and through conductor 266 now includes resistors 226, 228 and 236, thus providing a value of R1 equal to the total of these three resistors.

This value of R1 forms part of the Wheatstone bridge 274 as shown in FIGURE 5. Contact 264 is grounded at 275, and contact 262 is connected to another variable resistance R2. The other side of R2 is connected to con-

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tact point 276, which in turn is connected to the grid 278 of an amplifying tube 280 by means of conductor 282.

Contact 284 is interposed between fixed resistances R3 and R4, which complete the Wheatstone bridge. A 12-volt alternating current is impressed between the contact 262 and 284. The tube 280 has a plate 286 in series with a resistance 288 and a filament 290 having a resistance 292 and a capacitor 294 in parallel therewith. Also in series with the plate 286 is a capacitor 296 and a resistance 298. Interposed between the capacitor 296 and resistance 298 is a contact point 300 connected to the grid 302 of second amplification stage 304 through conductor 306. The filament 308 is connected to a resistor 310 and parallel capacitor 312. The opposite end of resistors 292, 298 and 310 and capacitors 294 and 312 are connected to a common conductor 314, which in turn is grounded at 316.

The plate 318 of the tube 304 is connected to a capacitor 320 and a parallel solenoid 322. The far ends of resistor 288, capacitor 320 and solenoid 322 are connected to a common conductor 330. The solenoid operates the switch 324 from the open position shown in FIGURE 5 to a closed position in which the contact 325 of the switch forms a closed circuit with contact 325 of conductor 328. A 200-volt potential is impressed across conductors 330 and 314 as plate voltage.

The motor 64 is operated by a 110-volt alternating current potential, and in turn is connected to the resistance R2, which is the potentiometer 202, through the gearing 206 and 216 of the potentiometer shaft 204. The motor is connected to the switch 324 by conductor 332, and to the 10-volt source by conductor 334. Also connected to conductor 332 at contact 336 is conductor 338 terminating in contact 340. Connected to conductor 328 at contact 342 is conductor 344, capacitor 346 and conductor 348, terminating at contact switch 350. The contact switch 350 manually abuts the cam hub 208 and is manually operable thereby.

In operation, after the value of R1 has been determined by the circuitry in FIGURE 4, it is impressed in the Wheatstone bridge and the motor 64 driven to a null, at which point the bridge is balanced. When the bridge becomes balanced, voltage passes to the grid 278, causing the tubes 280 and 304 to conduct. This causes the solenoid 322 to reposition the switch 324 out of contact with contact 326.

After the image has been projected on the screen for a sufficient interval of time, the reset relay 352, which includes a solenoid 354, causes switch 355 to move from contact 356 to contact 357, once again causing the motor circuit to close, and operating motor 64. The operation causes the cam hub 208 to continue rotation until it returns to its initial or starting position, at which point switch 350 breaks contact with contact point 340 and the motor ceases operation until the cycle is repeated.

The same vertical input signal which drives the circuitry of FIGURE 4 also operates the circuitry shown in FIGURE 6. This circuit is used to select a mask 166-171 having an aperture sized according to the distance achieved by the golf drive, thus providing a more accurate simulation of size of the golf ball as it moves a specified distance from the simulated point of origin of the drive. There are shown switches 360, 361, 362, 363, 364 and 365, normally positioned against ground contacts 366, 367, 368, 369, 370 and 371. The switches are connected by conductors to solenoids 372, 373, 374, 375, 376 and 377. Connected also to the solenoids are contact points 378, 379, 380, 381, 382 and 383. All the masks have through apertures except the masks activated by solenoid 377 which has a single aperture. The first five switches are keyed to approximate length distances and are individually activated as the information is received from the computer. Continuing the example previously mentioned with a drive of two hundred thirty yards, switch 363 will

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be closed to make contact with contact point 381, closing the circuit and activating solenoid 375. This causes mechanical movement of the arm and pivoting of respective masks to bring the appropriately sized smaller aperture in the alignment path of the light source, and the lens thus limits the size of the image projected upon the screen accordingly. During this period, the remaining masks are so positioned that the larger apertures therein lie in the light ray path. At the completion of the movement sequence and the interval pause at the end of the sequence, the reset relay 352 is activated and causes switch 365 to contact point 383, thus activating solenoid 377 and causing the single aperture mask to position itself in the light ray path. Since there is no smaller aperture in this mask, the source of light will be completely blocked from the lens, thus eliminating the image from the screen during the resetting operation of the scanning projector.

The same relay switch activates the horizontal positioning circuit. As shown in FIGURE 7, upon receipt of the first input or horizontal signal from the computer, one or more of the resistors 384, 385, 386 and 387 are interconnected. The switches 388, 389, 390 and 391 are normally positioned against ground contacts 392, 393, 394 and 395. The opposite ends of the resistors are connected to a conductor 396 which is in series with the galvanometer 58. The galvanometer is grounded at 398, completing the circuit.

Operation of the device 10 causes the reset relay to activate switch 355, moving it into contact with contact point 356. The computer will activate one of the four switches, for example switch 388, causing it to come into contact with contact point 400. This will cause a completed circuit containing resistor 384 in series with the galvanometer 58. As the galvanometer armature pivots, it will cause the mirror 56 to move accordingly for projection of an image in approximately a correct horizontal location, according to the angle of the golf drive.

In summary, the scanning projector 12 receives two input signals from the computer. The first signal is the horizontal positioning signal which activates the circuit shown in FIGURE 7, which positions the mirror for horizontal location of the projected image upon the screen. The second signal is the vertical or distance signal, and initially positions the masks as shown in FIGURE 6, and establishes the value R1. With the establishment of R1 the circuitry in FIGURE 5 is activated, thus showing the vertical path movement of the ball image on the screen until the bridge is balanced and the motor circuit is opened. After a slight pause, the reset relay 352 is activated and the mask 171 is moved to cut off the light source and cause the image to disappear from the screen, and at the same time to close the motor circuit to cause the galvanometer to return to initial vertical position prior to the next drive.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. Apparatus to provide a golf ball image-projection for a computer type golf game, comprising: a scanning projector having a light source and projection lens, first input means providing a horizontal signal to said projector, second input means providing a vertical signal to said projector, masking means in said scanning projector between said light source and said lens, said masking means being activated by said second input means, and image scanning means in said projector including a horizontal positioning member and actuated by said first input means and a vertical positioning member actuated by said second input means.

2. The invention according to claim 1, in which said masking means includes a plurality of dual aperture masks activated by solenoids, said apertures including a sub-

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stantially large diameter aperture to allow passage of light from said light source to said lens without obstruction thereof and a smaller sized aperture sized to form a specific spot image.

3. The invention according to claim 2, in which at least one of said masks has no smaller aperture, and is activated to completely block the passage of light from the light source to said lens.

4. The invention according to claim 1, in which said horizontal and vertical positioning members include a galvanometer having a mirror pivotally mounted upon the armature thereof for pivotal movement about a horizontal axis upon said scanning projection.

5. The invention according to claim 4, in which hori-

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zontal electrical circuit means govern the movement of said galvanometer, and in which vertical electrical circuit means provides a preselected image size and provides movement of said image in a vertical path on said screen.

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