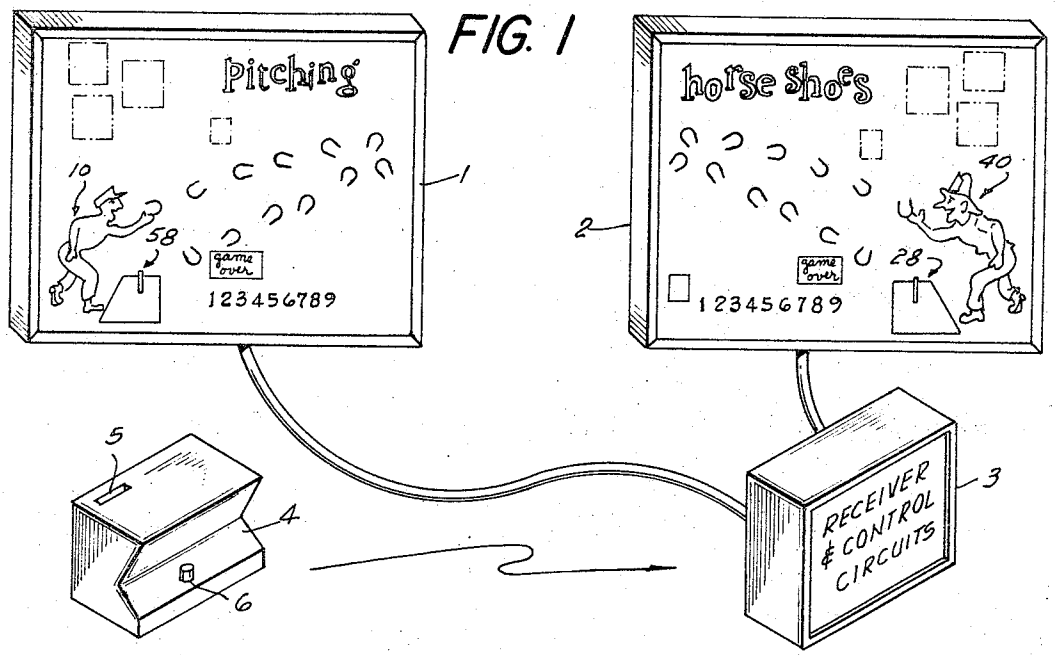
Aug. 22, 1967 F. A. HURLEY 3,337,218

AMUSEMENT APPARATUS

Filed Sept. 8, 1964 6 Sheets-Sheet 1

FIG. 1



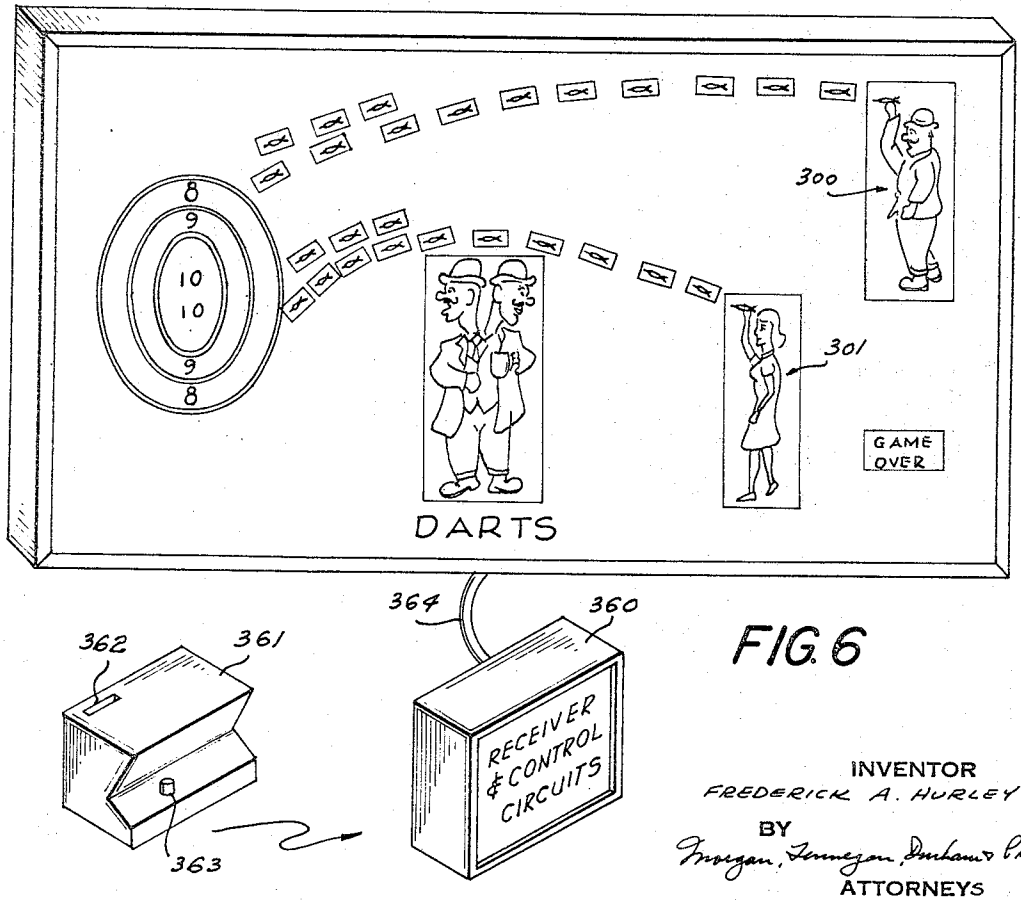


FIG. 6

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AMUSEMENT APPARATUS

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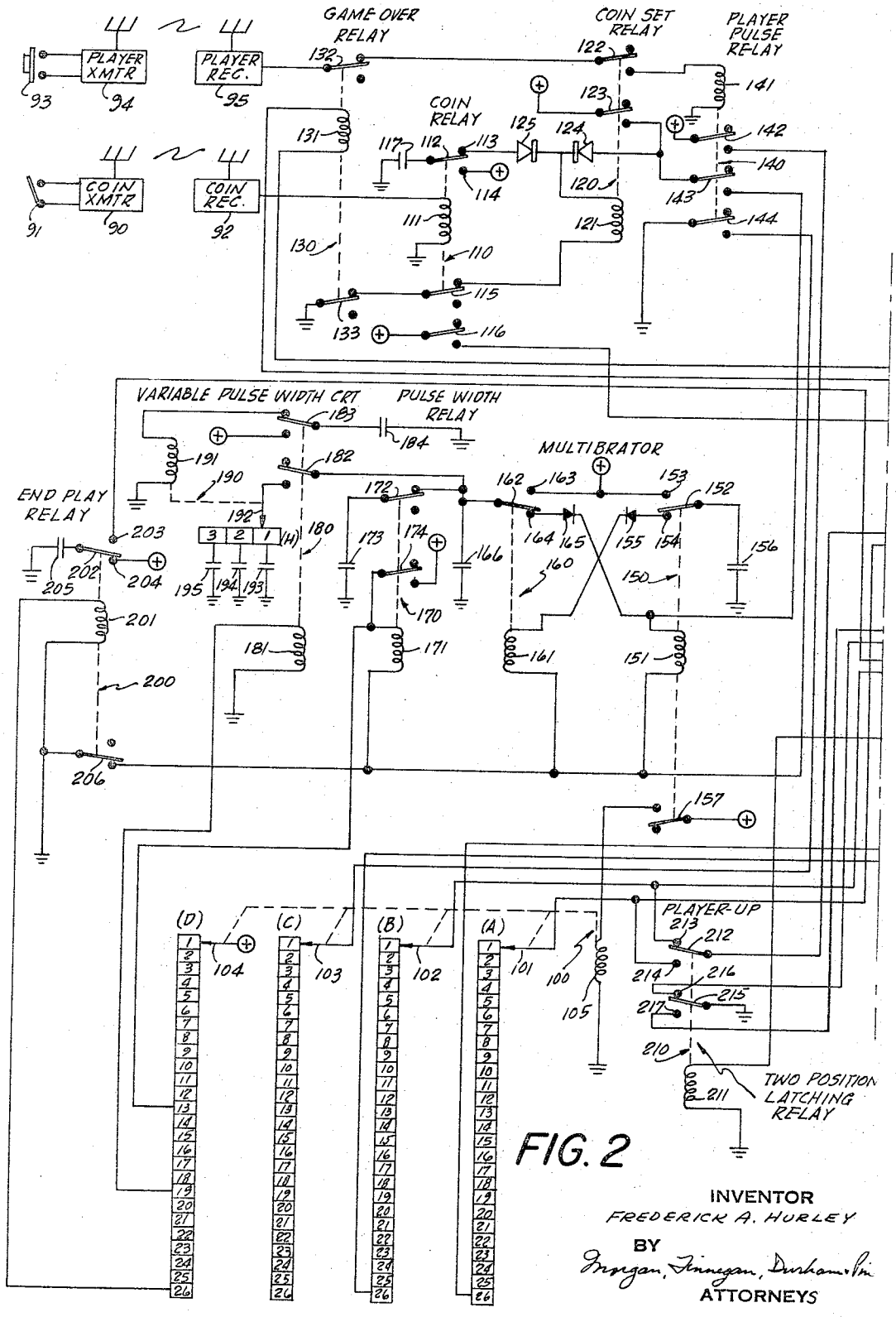

FIG. 2

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AMUSEMENT APPARATUS

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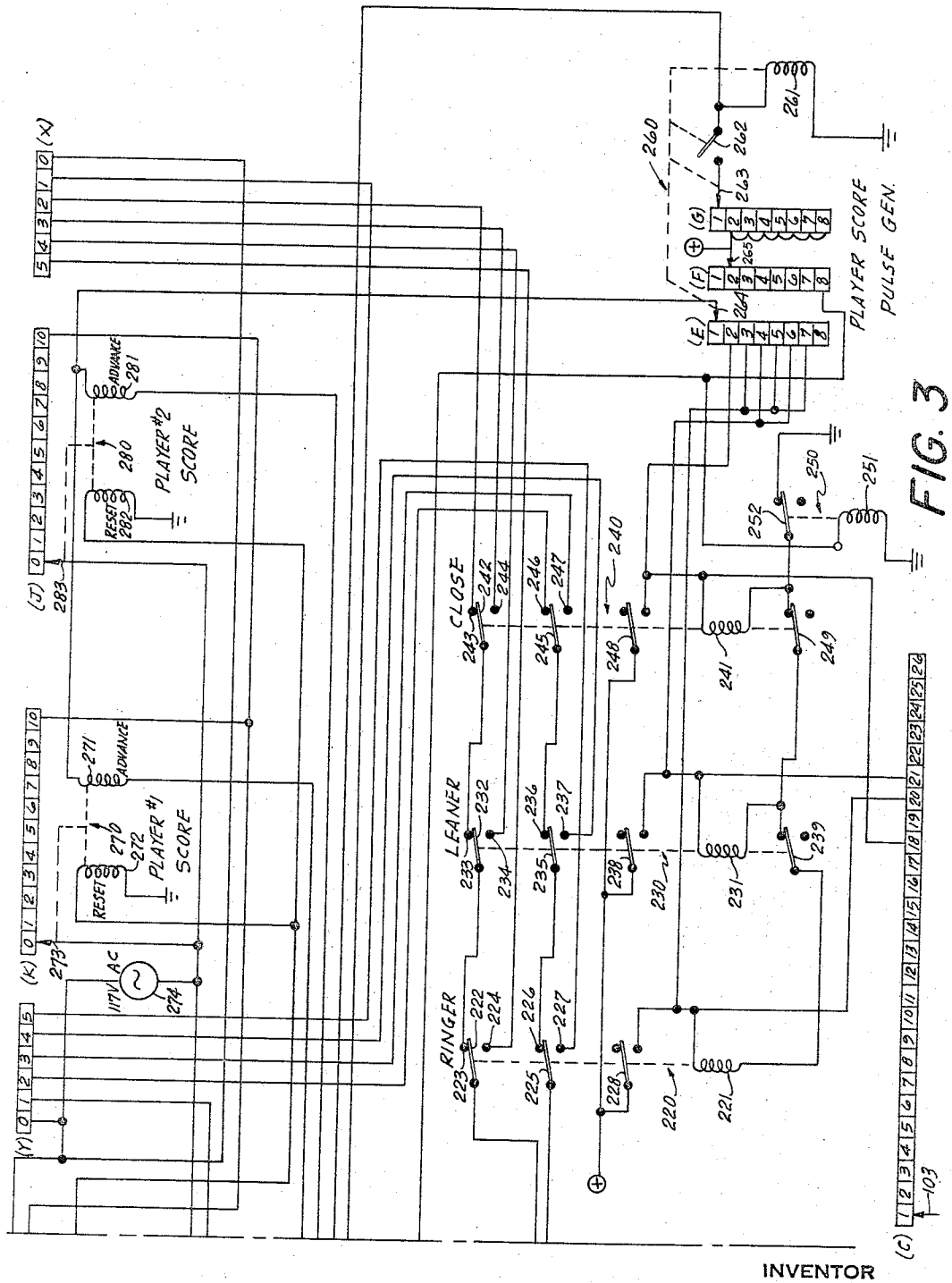

FIG. 3

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AMUSEMENT APPARATUS

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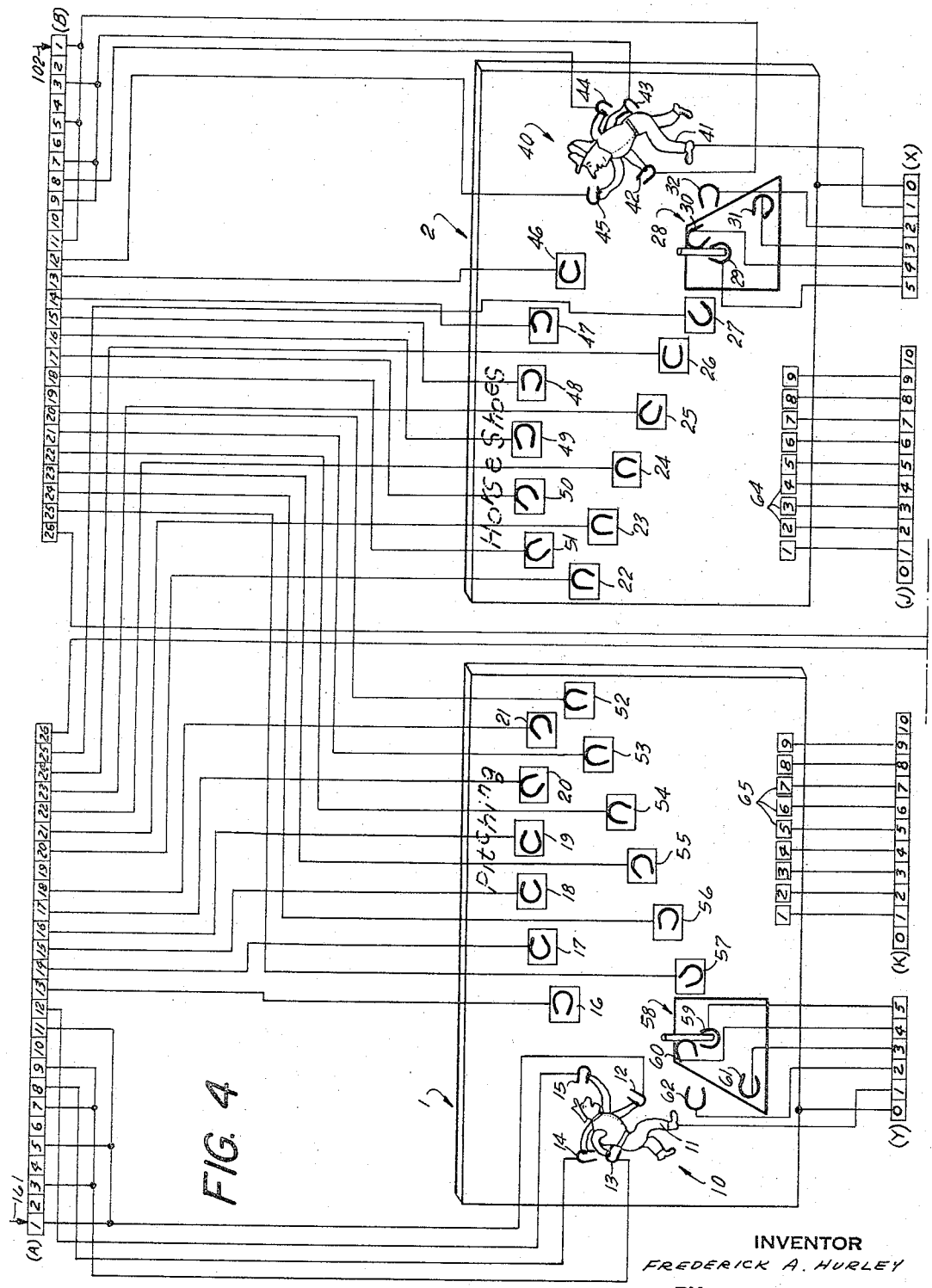

FIG. 4

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AMUSEMENT APPARATUS

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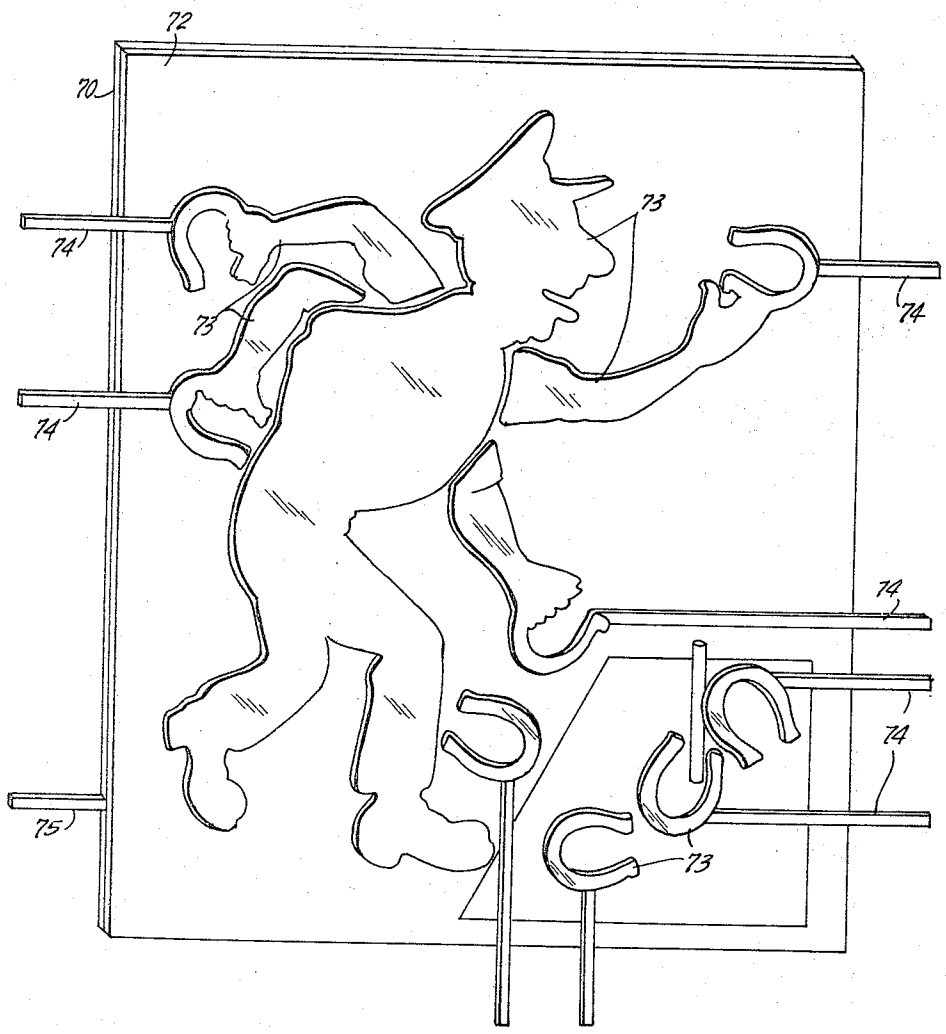

FIG. 4a

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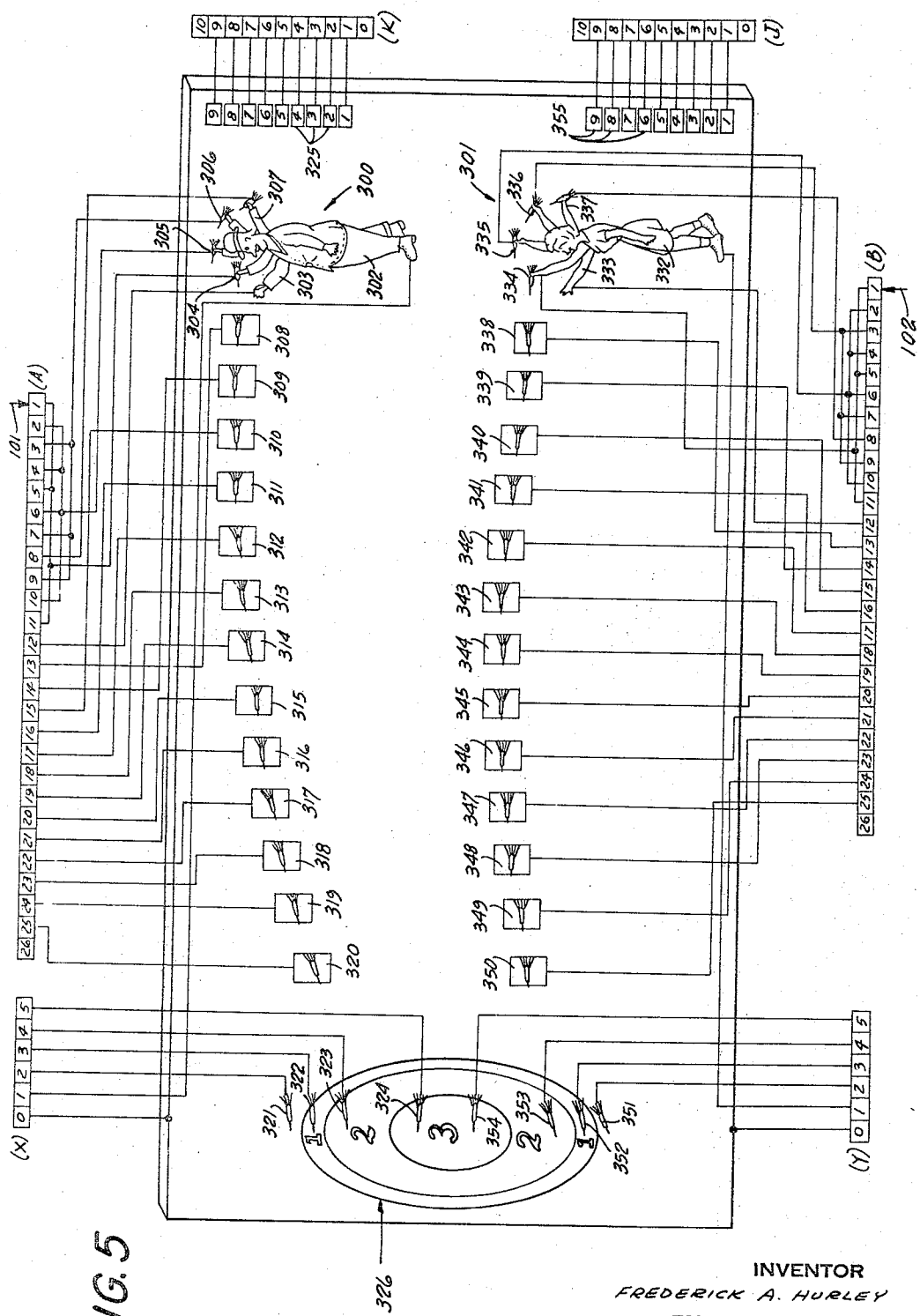

FIG. 5

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United States Patent Office 3,337,218 Patented Aug. 22, 1967

3,337,218

AMUSEMENT APPARATUS

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Filed Sept. 8, 1964, Ser. No. 394,763
24 Claims. (Cl. 273—85)

This invention relates to amusement apparatus, and while not limited thereto, relates to remotely controlled game apparatus including a selectively illuminated display unit which may be wall mounted.

In the past, most coin-operated amusement devices were of a mechanical nature and therefore required a generally horizontal playing surface. Because of this horizontal playing surface substantial floor space is required, and hence, these prior units could only be installed in establishments where the money taken in was sufficient to justify the loss of floor space. Also, it would be necessary for the players to go to the physical location of the amusement device which, in some cases, would disrupt the normal business operation.

It is an object of this invention to provide amusement apparatus which requires negligible floor space, which can be played from any location within the establishment when installed and which is capable of retaining the continuing interest of the players.

Another object is to provide amusement apparatus, including a unique scoring technique for simulated games of the type which normally would depend upon the player's skill in throwing an object toward a target area.

Another object is to provide a game apparatus which is designed to simulate a well known game in a manner which eliminates the need for special instructions to the players.

There are many well known games in which the player's skill in throwing an object toward a target area plays a significant part in the scoring of the game. Some examples include pitching horseshoes, throwing darts, basketball foul shooting and bowling. Any well known game of this sort can be used as the basis for the game apparatus in accordance with this invention in which the game is simulated on a selectively illuminated display panel.

In a typical installation, the display panel consists of a partially transparent mask and associated electroluminescent panels which are selectively illuminated to provide the desired animation for the game. The apparatus is controlled remotely from a unit which includes a player operated push button switch. When the switch is first actuated, a cartoon character on the display panel appears to wind-up and release an object which then appears to travel toward the target area. While the object is in its trajectory toward the target area, the player actuates the push button switch a second time. If the actuation is at the proper time, the player will score a hit, whereas, if the actuation is either too late or too soon, a miss is registered. The manner in which the hit or miss is indicated and scored will vary in accordance with the particular game being simulated.

The manner in which the foregoing and other objects are achieved in accordance with this invention is set forth more fully in the following specification which describes several illustrative embodiments of the invention. The drawings form a portion of the specification wherein:

FIG. 1 is a perspective view of the display panels for a horseshoe game as seen by the player, along with the associated control circuit unit and remote control unit;

FIGURES 2 and 3 are interrelated and form a single schematic diagram of the control circuits;

FIG. 4 is a perspective plan view of the display panels for a horseshoe game showing how the individual electroluminescent panels are connected to various contacts and terminals of the control circuits;

FIG. 4*a* is a perspective view illustrating the electroluminescent panel for the policeman figure and adjacent horseshoe pit;

FIG. 5 is a perspective plan view of a display panel for a dart game showing how individual electroluminescent panels are connected to various contacts and terminals of the control circuits; and

FIG. 6 is a perspective drawing showing the display panel for a dart game and its associated control circuit unit and remote control unit.

Horseshoe game

One of the games used as the basis for game apparatus in accordance with this invention is the well known horseshoe game. Normally, this game is played outdoors between a pair of horseshoe pits, each having a stake in the center. The players alternate in throwing horseshoes from a location behind one of the pits toward the stake in the other pit. If the horseshoe lands surrounding the stake, the player scores a ringer worth three points; if the horseshoe lands leaning against the stake the player scores a leaner worth two points; and if the horseshoe lands within a certain distance from the stake, the player scores a close-shoe worth one point.

The apparatus used in simulating the horseshoe game is shown in FIG. 1 and includes a pair of display units **1** and **2**, a control circuit unit **3**, and a remote control unit **4** which is coupled to the control circuits by a radio transmitter-receiver system. The apparatus is actuated by depositing a coin of the proper monetary value via coin slot **5** in remote control unit **4**. Thereafter, when push button switch **6** is actuated, the policeman cartoon character on display unit **1** appears to go into motion, first winding up and then releasing a horseshoe which appears to travel toward the horseshoe pit on display unit **2**. During the simulated flight of the horseshoe toward the horseshoe pit, the player must actuate the push button switch a second time. When the horseshoe lands in the horseshoe pit on display unit **2** it will appear as a ringer, leaner, close-shoe, or out of the pit, depending upon the time at which the push button switch is actuated. Upon the next actuation of the push button switch, the cartoon fireman on display unit **2** goes into action, appearing to first pick up the horseshoe, then wind up and thereafter throw the horseshoe back to the horseshoe pit shown on display unit **1**. The final location of the horseshoe is similarly determined in accordance with the time at which the push button switch is actuated during simulated flight of the horseshoe.

Display units for the horseshoe game

FIG. 4 illustrates the various individual areas on display units **1** and **2** which are selectively illuminated to provide the animated game display for the horseshoe game. The cartoon character **10** of a policeman appears on display unit **1** and is presented by means of an electroluminescent panel **11** which is of the appropriate shape to depict the body of the policeman, and four separate electroluminescent panels **12–15** shaped and positioned to depict the arm of the policeman in four different positions. In the animated figure there are actually five different arm positions, but in one of these positions the arm is alongside the body, and hence, the arm does not show. Also included on display unit **1** are six separate electroluminescent panels **16–21**, which represent six successive positions of the horseshoe after it has been thrown by the policeman. On display unit **2** there are six additional electroluminescent panels **22–27** which represent six additional successive positions for the same horseshoe as it travels from the policeman toward horseshoe pit **28** on display unit **2**. Electroluminescent panels **12–27** are energized in a sequence such that the policeman appears to take a short swing back, then a short swing forward, a full swing back, and finally a full swing forward

at which time the horseshoe appears to be released. By energizing electroluminescent panels **16–21** in succession, the horseshoe then appears to travel away from the policeman and out of display unit **1**. Later, the horseshoe appears to enter display unit **2** and travel toward horseshoe pit **28**, this being accomplished by energizing electroluminescent panels **22–27** in succession.

Within the area of horseshoe pit **28** there are four separately energizable electroluminescent panels which, when energized, indicate the four possible positions for the horseshoe at the end of its trajectory. Electroluminescent panel **29** indicates the horseshoe in its ringer position, panel **30** indicates the horseshoe in its leaner position, panel **31** indicates the horseshoe in its close-shoe position, and panel **32** indicates the horseshoe outside the pit.

Display unit **2** includes the fireman cartoon **40**, formed by an electroluminescent panel **41** in the shape of the body for the fireman. Four electroluminescent panels **42–45** represent the four arm positions so that by properly sequentially energizing the individual panels, the fireman will appear to pick up the horseshoe from pit **28**, then take a short swing back, a short swing forward, a full swing back, and then a full swing forward at the end of which the horseshoe is released. Electroluminescent panels **46–51** on display unit **2** and electroluminescent panels **52–57** on display unit **1** represent various positions of the horseshoe while in its trajectory from the fireman to horseshoe pit **58**. Electroluminescent panels **59–62** represent the ringer, leaner, close-shoe, and out of pit positions respectively.

Electroluminescent panels **64** on display unit **2** are used to indicate the fireman's score. This is accomplished by energizing a selective one of these panels which then provides a corresponding numerical indication. Electroluminescent panels **65** on display unit **1** similarly indicate the policeman's score.

Although the display unit can be constructed in any desired manner, the preferred structure is of the type described in co-pending application Ser. No. 394,858 filed Sept. 8, 1964 such that each display unit would include a printed circuit board upon which the individual electroluminescent panels are mounted, and an associated partially transparent front panel which appears in the form of a mask. A suitable background design, such as that shown in co-pending design patent application Ser. No. D. 82,315 filed Oct. 26, 1964, now design Patent No. 202,794 can be silk screened onto the front panel. Certain selected areas of the front panel are left blank so that these areas can be illuminated from behind by energizing the appropriate ones of the electroluminescent panels.

The representations of the horseshoe in its various positions can most easily be achieved by using a small square shaped electroluminescent panel aligned with an associated transparent area on the front panel in the shape of a horseshoe. The various score indications are similarly achieved by using a square shaped electroluminescent panel and an associated transparent area on the front panel in the shape of the desired number.

The separately energizable electroluminescent panels for the cartoon figures and the horseshoes in the pits can be obtained in similar fashion, but in this case it is more convenient to achieve the display by means of a single electroluminescent panel and a large rectangular transparent area on the front panel. A suitable electroluminescent panel for display unit **1** is shown in FIG. *4a* and includes a conductive backing layer **70** covered with a crystalline fluorescent material forming a dielectric layer **72**. Translucent conductive layer portions **73** are placed over the dielectric, these portions being in the shape of the body of the policeman, the various arm positions for the policeman, and the four horseshoes in the pit. An individual lead **74** is brought out from each of the conductive layer portions **73**, and a lead **75** is brought out from the conductive backing layer. When an alternating current signal is applied to the backing layer **70**, and one of the translucent conductive portions **73**, the portion of the dielectric layer between the energized conductors is excited and emits light through the translucent conductor. An electroluminescent panel for the fireman and associated pit **28** is constructed in similar fashion for display unit **2**.

The leads from each of the electroluminescent panels are bent back and are passed through pre-positioned holes in the printed circuit board. After passing through the holes, the leads are bent over and soldered to conductors surrounding holes. The printed conductors connect the delicate leads from electroluminescent panels to various terminal points to which wires from the control circuits are attached.

The electrical control circuits

When FIG. 2 is placed in a vertical position on the left and FIG. 3 is positioned horizontally on the right, they form a single integrated schematic diagram of the control circuits for the horseshoe game.

Switch **91** is part of a conventional coin mechanism and is closed momentarily each time a coin is deposited via coin slot **5** in the remote control unit (FIG. 1). Switch **91** is connected to a transmitter unit **90** (referred to as the coin transmitter and housed within the remote control unit) so that a radio signal will be transmitted to an associated coin receiver unit **92** each time the switch is closed. Coin receiver **92** is connected to energize an actuating winding **111** of a relay **110** in response to each received radio pulse. Similarly, switch **93** is associated with push button **6** (FIG. 1) and is connected to a player transmitter **94** so that the transmitter sends out a radio signal each time the push button is actuated by the player. An associated player receiver unit **95** is connectable to energize an actuating winding **141** via contacts **122** and **132** in response to each successive radio signal. Although the coupling between switches **91** and **93** and the associated portions of the control circuits is shown as two separate transmitter-receiver systems, it should be obvious that any two channel communication system would suffice. This could, for example, be a single transmitter-receiver system with a two channel multiplex achieved by the use of different modulation frequencies or different pulse lengths. In some installations switches **91** and **93** can simply be coupled to the control circuits by wire connections.

Relay **110** is referred to as the coin relay since it is energized each time coin switch **91** is closed. Associated with relay **110** is a capacitor **117** which is connected between ground and a movable contact **112** of relay **110**. Capacitor **117** is connected to a positive source of potential via movable contact **112** and the associated normally closed stationary contact **114** when the coin relay is energized. When relay **110** is in the de-energized state, capacitor **117** is connected to one end of an actuating winding **121** via movable contact **112**, stationary contact **113** and a semiconductor isolating diode **125**. The other end of actuating winding **121** is connected to ground via normally closed contacts **115** of relay **110** connected in series with normally closes contacts **133** of a relay **130**. Actuating winding **121** is part of a relay **120** referred to as the coin-set relay. The coin-set relay has a holding circuit which is completed from the positive source of potential through normally open contacts **123** of relay **120** and a semiconductor diode **124** connected to the non-grounded end of actuating winding **121**.

Thus, when switch **91** is closed momentarily, actuating winding **111** of the coin relay is momentarily energized, and therefore, capacitor **117** is charged by means of the circuit completed through movable contact **112** and stationary contact **114**. Thereafter, when the coin relay returns to the de-energized state, capacitor **117** is discharged via diode **125** to initially energized actuating winding **121** which is thereafter maintained in the en-

ergized state by means of the holding circuit completed through contacts **123** and diode **124**.

The animation of the display unit is controlled primarily by a main stepping switch **100** which is a twenty-six position switch having four banks of contacts designated A, B, C and D. Contact banks A and B are reproduced in FIGS. 4 and 5 to show connections to the various electorluminescent panels, and contact bank C is reproduced in FIG. 3 to show connections to some of the scoring circuitry. The stepping switch is set in motion in response to an actuation of player switch **93**, and advances at rate determined by a multivibrator circuit, including relays **150** and **160**. In order to achieve the best animation it is desirable that the main stepping switch advance at a slow rate through the first twelve positions which control the wind up swings of the cartoon figure on the display unit. The stepping switch should advance at a faster pace when advancing from position **13** to position **26**, since these positions control the display of the simulated horseshoe appearing to fly from one of the cartoon characters toward the horsehoe pit. This change of pace is achieved by a circuit incdluding relay **170** which is referred to as the pulse width relay. Also, it is desirable that the time required for the simulated horseshoe to travel from one of the display units to the other should vary with each play. This function is achieved by a variable pulse width circuit which includes a relay **180** and a stepping switch **190**.

The multivibrator circuit includes relays **150** and **160** which are interconnected so that when one relay changes to the de-energized state, the other relay automatically assumes the energized state. A capacitor **156** is connected between ground and a movable contact **152** of relay **150**, and a capacitor **166** is connected between ground and a movable contact **162** of relay **160**. The normally open stationary contacts **153** and **163** associated respectively with movable contacts **152** and **162**, are each connected to the positive source of potential. The normally closed stationary contact **164** associated with movable contact **162** is connected to one end of actuating winding **151** of relay **150** via an isolating diode **165**, and normally closed stationary contact **154** associated with movable contact **152** is connected to one end of actuating winding **161** of relay **160** via an isolating diode **155**. The other ends of windings **151** and **161** are connectable to ground either via normally closed contacts **206** of relay **200**, or normally open contacts **144** of the player pulse relay. The non-grounded end of winding **151** is also connectable to the positive source via normally open contacts **143** and **123**.

When relay **130** is de-energized and relay **120** is energized (the conditions existing during a game) player receiver **95** is connected to winding **141** of the player pulse relay, and therefore, relay **140** is energized momentarily each time switch **93** is actuated. When the player pulse relay is energized, winding **151** in the multivibrator circuit is energized via contacts **123** and **143** thereby initiating the operation of the multivibrator circuit. During the initial energization of relay **150**, capacitor **156** is charged from the positive source via contacts **152** and **153**. Thereafter, when relay **150** returns to the de-energized state, capacitor **156** is discharged via movable contact **152**, stationary contact **154** and diode **155** to energize winding **161**. Winding **161** remains energized for a period of time determined by the discharge time constant of capacitor **156**, and while in the energized state causes capacitor **166** to be charged via movable contact **162**. Thereafter, when relay **160** returns to the de-energized state, capacitor **166** is discharged to again energize winding **151** of relay **150**. Relay **150** remains in the energized state for a period of time determined by the capacitance connected to movable contact **162**. Thus, once operation has been initiated by depressing switch **93**, the multivibrator circuit transfers the energized state back and forth between relays **150** and **160** in free-running fashion. Relay **150** includes a set of normally open contacts **157** connected between the positive source and one end of actuating winding **105**, the other end of winding **105** being connected to ground. Thus, each time relay **150** is energized, winding **105** of the main stepping switch is also energized to thereby advance the stepping switch by one position.

The rate at which the multivibrator circuit operates, and hence, the rate at which the main stepping switch advances, is determined by the capacitance connected to movable contacts **152** and **162** since this determines the discharge time constants. Thus, if the total capacitance connected to movable contact **162** is increased, the multivibrator circuit operates at a slower rate, and if the capacitance is decreased the multivibrator circuit operates at a faster rate.

A capacitor **173** is connectable to movable contact **162** via the normally closed contacts **172** of a relay **170** referred to as the pulse width relay, and thus, when relay **170** is in the de-energized state capacitor **173** is connected in parallel with capacitor **166**. Capacitors **173**, **166** and **156** are selected to obtain the desired operating speed for the first twelve positions of the main stepping switch, or, in other words, to obtain the desired motion for the cartoon character during the wind up period prior to releasing the horseshoe.

Wiper contact **104** associated with contact bank D of the main stepping switch is connected to the positive source, and contact D–**13** in that bank is connected to one side of actuating winding **171** of the pulse width relay. The other end of actuating winding **171** is connectable to ground via normally closed contacts **206**. A holding circuit for relay **170** is completed via normally opened contacts **174** of relay **170** connected between the positive source and the non-grounded end of winding **171**. Accordingly, as the stepping switch advances through the first twelve positions, relay **170** is in the de-energized state and capacitor **173** is connected in parallel with capacitor **166** so that the multivibrator advances the stepping switch at a relatively slow pace. When the stepping switch reaches the thirteenth position, relay **170** is energized via wiper contact **104** and stationary contact D–**13**, and therefore, capacitor **173** is disconnected. The holding circuit is then completed via contacts **174** to maintain relay **170** in the energized state as the stepping switch continues to advance toward the twenty-sixth position. Capacitors **166** and **156** are selected having values which will produce the proper stepping pace to simulate the flight of the horseshoe from the cartoon figure to the horseshoe pit.

Three capacitors **193**, **194** and **195**, each of different size, are connected between ground and stationary contacts H–**1**, H–**2** and H–**3**, respectively, of a three position stepping switch **190**. The stationary contacts of stepping switch **190** are disposed radially so that contact H–**3** is adjacent to contact H–**1**, and thus, the stepping switch can continue to advance and need not be reset. The stepping switch advances one position in response to each successive energization of actuating winding **191**. Wiper contact **192** is connected to movable contact **162** via a set of normally open contacts **182** of relay **180**. One end of actuating winding **181** associated with relay **180** is connected to ground and the other end is connected to contact D–**19** of the main stepping switch. A capacitor **184** is connected between ground and movable contact **183** of relay **180**. The normally open stationary contact associated with movable contact **183** is connected to the positive source, and the associated normally closed contact is connected to ground via actuating winding **191**.

Accordingly, when the main stepping switch reaches the nineteenth position, relay **180** is energized via wiper contact **104** and stationary contact D–**19**. Relay **180** closes contacts **182** thereby connecting one of the capacitors **193**–**195** in parallel with capacitor **166**. This has the effect of increasing the time required for the main stepping switch to reach the twentieth position, or in other words, it increases the time required for the simulated horseshoe

to travel between the display units. The extent of the time increase depends upon which one of the capacitors 193–195 is connected via stepping switch 190. When relay 180 is in the energized state, capacitor 184 is charged via movable contact 183, and thereafter when relay 180 returns to the de-energized state, capacitor 184 discharges via winding 191 thereby advancing wiper contact 192 by one position. Thus, the time required for the simulated horseshoe to jump from one display panel to the other varies with each successive play. As will be explained later, this time variation makes it more difficult for the players to score a ringer and, thus, makes the game more interesting to play.

Contact D–26 of the main stepping switch is connected to ground via an actuating winding 201 of a relay 200 referred to as the end play relay. As was previously mentioned, the ground circuits for windings 151, 161 and 171 are completed through normally closed contacts 206 of relay 200. Therefore, when the main stepping switch completes its twenty-six step sequence and reaches contact D–26, relay 200 is energized to open the ground circuits for relays 150, 160 and 170. As a result, the free-running multivibrator becomes inactive and supplies no further pulses to the main stepping switch. Also, the hold circuit for relay 170 is released permitting the pulse width relay to return to its de-energized state.

Relay 210 is a two position latching relay which changes to an alternate position each time the associated actuating winding 211 is energized, which takes place upon the completion of each successive play. An AC source 274 (FIG. 3), which supplies electrical energy for the electroluminescent panels, has one terminal connected to the leads connected to the backing conductive layers of the electroluminescent panels via terminals YO and XO. The other terminal from source 274 is connected to movable contact 212 of relay 210. One of the stationary contacts 213 associated with movable contact 212 is connected to energize wiper contact 102 on the main stepping switch and to also energize electroluminescent panel 41 (the body portion of the fireman) via terminal X–1. Referring to FIG. 4, it should be noted that the stationary contacts of contact bank B are connected to electroluminescent panels 42–57 associated with the fireman. Therefore, when the main stepping switch advances at a slow pace through the first twelve positions, electroluminescent panels 42–45 associated with the various fireman arm positions are energized via contacts B–1 through B–12. More specifically, contacts B–1, B–5 and B–11 are connected to panel 42, contacts B–3, B–7 and B–9 are connected to panel 43, contact B–8 is connected to panel 44, and contact B–12 is connected to panel 45. In following the stepping sequence, the fireman first takes a short swing back, a short swing forward, a full swing back and then a full swing forward, the sequence being completed when the stepping switch reaches the twelfth position. Thereafter, the stepping pace increases due to the action of pulse width relay 170 and electroluminescent panels 46–51 are energized successively via contacts B–12 through B–18 to thereby simulate the flight of the horseshoe away from the fireman. The nineteenth position of the main stepping switch, associated with contact B–19, occurs at a time when the simulated horseshoe is traveling between display units 2 and 1. This time interval is variable due to the operation of the variable pulse width circuit. Next, electroluminescent panels 52–57 are energized in succession via contacts B–20 through B–25, respectively, to complete the simulated flight of the horseshoe toward horseshoe pit 58 on display panel 1.

When the main stepping switch reaches the twenty-sixth position, a circuit is completed from contact B–26 via the scoring circuits (shown primarily in FIG. 3) to energize one of the electroluminescent panels 59–62. If the player actuates player push button switch 93 when the stepping switch is in the eighteenth position, that is just before the simulated horseshoe leaves display panel 2, the player scores a close-shoe and electroluminescent panel 61 is energized via terminal Y–3 when the stepping switch reaches the twenty-sixth position. If the player switch is actuated when the main stepping switch is in the twentieth position, that is just after the simulated horseshoe has entered display panel 1, the player scores a ringer indicated by energizing electroluminescent panel 59, and if the player switch is actuated while the main stepping switch is in the twenty-first position the player scores a leaner indicated by energizing electroluminescent panel 60. It should be noted that the highest scores are registered if the player switch is actuated just after the simulated horseshoe enters display panel 1, which, due to the variable time period associated with position 19, takes both skill and luck.

The other stationary contact 214 associated with movable contact 212 of the player-up relay is connected to apply the AC signal to wiper contact 101 associated with contact bank A of the main stepping switch, and is also connected to apply the AC signal to electroluminescent panel 11 via terminal Y–1 to thereby illuminate the body portion of the policeman. Accordingly, the policeman appears to wind up and then throw the horsesoe as the main stepping switch advances through its twenty-six positions. This is achieved by the connections of contacts A–1, A–5 and A–11 to electroluminescent panel 12, contacts A–3, A–7, and A–9 to electroluminescent panel 13, contact A–8 to electroluminescent panel 14 and contact A–12 to electroluminescent panel 15. Contacts A–13 through A–18 are connected to electroluminescent panels 16–21, respectively, and contacts A–20–A–25 are connected to electroluminescent panels 22–27, respectively. The appropriate ones of electroluminescent panels 29–32 are energized through the scoring circuits when the main stepping switch reaches the twenty-sixth position.

The scoring apparatus includes relays 220, 230 and 240 referred to respectively as the ringer, leaner and close-shoe score relays. Stationary contact C–18 of the main stepping switch is connected to one end of actuating winding 241 associated with relay 240, contact C–20 is connected to one end of actuating winding 221 of relay 220, and contact C–22 is connected to one end of actuating winding 231 of relay 230. The other end of winding 221 is normally connected to ground via normally closed contacts 239 of relay 230, normally closed contacts 249 of relay 240 and normally closed contacts 252 of a relay 250, these normally closed contacts being connected in series. The other end of actuating winding 231 is normally connected to ground through normally closed contacts 249 and 252, and actuating winding 241 is connected to ground via normally closed contacts 252. Normally open contacts 228, 238 and 248 are connected between the positive source and the non-grounded ends of actuating windings 221, 231 and 241, respectively, to complete holding circuits for relays 220, 230 and 240. Wiper contact 103 associated with the C bank of contacts (as shown in FIG. 2) is connectable to the positive source via normally open contacts 142 of player pulse relay 140.

If player push button switch 93 is actuated while the main stepping switch is in the eighteenth position, relay 240 is energized via contacts 142 of the player pulse relay, wiper contact 103, and stationary contact C–18, the relay thereafter being maintained in the energized state by the holding circuit completed through contacts 248. If the player push button switch is actuated while the main stepping switch is in the twentieth position, relay 220 similarly becomes energized, and likewise, if the player push button switch is actuated while the main stepping switch is in the twenty-first position relay 230 is energized.

Contacts 239 and 249 prevent more than one of the relays 220, 230 and 240 from becoming energized at the same time. Accordingly, if the player push button switch is actuated while the main stepping switch is in the eighteenth position thereby energizing relay 240, sub-

sequent actuation of the push button switch while the main stepping switch is in the twentieth or twenty-first position will be ineffective since contacts **249** are open. On the other hand, if the player push button switch is first actuated when the main stepping switch is in the twentieth position thereby energizing ringer score relay **220**, a subsequent actuation when the main stepping switch is in the twenty-first position energizes leaner score relay **230** which opens contacts **239** to de-energize relay **220** so that the lower of the two scores is registered.

Contact A–**26** of the main stepping switch (connection shown in FIG. 2) is connected to movable contact **222** of relay **220**, and the associated normally open stationary contact **224** is connected to electroluminescent panel **29** via terminal X–**5**. The normally closed stationary contact **223** associated with movable contact **222** is connected to movable contact **232** of relay **230** and the normally open associated contact **234** is connected to electroluminescent panel **30** via terminal X–**4**. Normally closed stationary contact **233** associated with movable contact **232** is connected to movable contact **242** of relay **240** and the associated normally open stationary contact **244** is connected to electroluminescent panel **31** via terminal X–**3**. Normally closed stationary contact **243** is connected to electroluminescent panel **32** via terminal X–**2**.

If wiper contact **101** of the main stepping switch is energized via movable contact **212** of player-up relay **210**, and if none of relays **220**, **230** or **240** is energized when the stepping switch reaches the twenty-sixth position, a circuit is completed via movable contacts **222**, **232** and **242**, stationary contact **243**, and terminal X–**2** to energize electroluminescent panel **32** which shows the horseshoe outside the pit, and thus, indicates a miss. Under similar circumstances, if relay **240** is energized when the main stepping switch reaches the twenty-sixth position, the circuit is completed via movable contacts **222**, **232** and **242**, stationary contact **244** and terminal X–**3** to energize electroluminescent panel **31** indicating a close-shoe. If leaner score relay **230** is energized the circuit is complete via movable contacts **222** and **232** to energize electroluminescent panel **30** indicating a leaner, and if relay **220** is energized the circuit is completed only through movable contact **222** to energize electroluminescent panel **29** indicating a ringer.

Contact B–**26** of the main stepping relay is similarly coupled to terminals Y–**2** through Y–**5** via movable contacts **225**, **235** and **245**, along with their associated stationary contacts, to provide similar displays with respect to horseshoe pit **58** when wiper contact **102** associated with contact bank B is energized.

The player score pulse generating circuit shown in FIG. 3 includes an eight position stepping switch having three banks of contacts designated E, F and G, the individual contacts of each bank being disposed radially so that the eight contact is adjacent to the first contact. Wiper contacts **264**, **265** and **263** associated with contact banks E, F and G, respectively, advance one position upon each successive energization of actuating winding **261**. Contacts G–**2** through G–**8** are all connected to the positive source, and associated wiper contact **263** is connected to one end of actuating winding **261** via off-normal contacts **262**. The other end of winding **261** is connected to ground. Off-normal contacts **262** open momentarily each time the stepping switch advances one position. The non-grounded end of winding **261** is also connected to a normally open stationary contact **203** of the end play relay **200** (FIG. 2). A capacitor **205** is connected between ground and a movable contact **202**. Stationary contact **204** is connected to the positive source so that capacitor **205** will be charged via movable contact **202** when relay **200** is in the de-energized state. As was previously mentioned, relay **200** is energized when the main stepping switch reaches the twenty-sixth position which in turn connects charged capacitor **205** to actuating winding **261**. As a result, stepping switch **260** advances to the second position, and is thereafter advanced to complete one revolution by means of the circuits completed via wiper contact **263**.

Normally open contact **228** of relay **220** is connected between the positive source and stationary contact E–**3**, E–**5** and E–**7** of stepping switch **260**. Normally open contact **238** of relay **230** is connected between the positive source and contacts E–**4** and E–**6**, whereas contact **248** is connected between the positive source and stationary contact E–**2**. Wiper contact **264** is connected to one end of windings **271** and **281** associated with stepping switches **270** and **280**, respectively. The other end of winding **271** is connectable to ground via stationary contact **217** and movable contact **215** of player-up relay **210**, and the other end of winding **281** is similarly connectable to ground via stationary contact **216** and movable contact **215**. Winding **281** is the advance winding for an eleven position stepping switch having contacts designated J–**0** through J–**10** associated with a wiper contact **283**. Contacts J–**1** through J–**9** are connected to electroluminescent panels **64** (FIG. 4) which are designed so that numerical score indications corresponding to the stepping switch position are presented on display panel **2**. One lead from AC source **274** is connected to the backing conductor of each of these electroluminescent panels, and the other lead from the AC source is connected to wiper contact **283**. Stepping switch **280** advances one position each time advance winding **281** is energized, and returns to the home position associated with contact J–**0** each time the associated reset winding **282** is energized. Stepping switch **270** is the same as stepping switch **280**, including an advance winding **271**, reset winding **272**, wiper contact **273**, and eleven stationary contacts designated K–**0** through K–**10**. Stepping switch **270** is connected to electroluminescent panels **65** in essentially the same manner as stepping switch **280** is connected to electroluminescent panels **64**.

If player-up relay **210** is in the position shown in FIG. 2, thereby conditioning advance winding **281** for actuation, and close-shoe score relay **240** is energized when stepping switch **260** is set in motion, a single pulse will be generated as wiper contact **264** passes stationary contact E–**2** which is energized via contacts **248**. This single pulse is applied to advance winding **281** thereby advancing stepping switch **280** by one position, or in other words, one point is added to the second player's score. If instead, leaner score relay **230** were energized, two pulses would be generated, one when the wiper contact passes stationary contact E–**4** and another when it passes stationary contact E–**6**, and hence, two points are added to the second player's score. If ringer score relay is energized, contacts E–**3**, E–**5** and E–**7** are energized and, therefore, three points will be added to the second player's score. If player-up relay **210** is in the position opposite to that shown in FIG. 2, advance winding **271** is conditioned instead of advance winding **281** and, thus, points would be added to the first player's score in a similar fashion.

Wiper contact **265** of stepping relay **260** is connected to the positive source, and associated stationary contact F–**8** is connected to ground via actuating winding **251** of relay **250**. Therefore, when stepping relay **260** is set in motion and reaches the eighth position, which occurs after the scores have been transferred from relays **220**, **230** and **240** over to stepping relays **270** and **280**, winding **251** of relay **250** is energized. This releases the holding circuits for windings **221**, **231** and **241** thereby permitting the associated relays to return to their de-energized state in anticipation of the next play. Stationary contact F–**8** is also connected to ground via winding **211** of player-up relay **210**. Accordingly, the player-up relay changes position each time a play is completed as indicated by energization of contact F–**8**.

Contacts K–**10** and J–**10** are connected so that actuating winding **131** of game over relay **130** is energized when either one of stepping switches **270** or **180** reaches their

tenth position. This opens contacts 132 to prevent any further actuation of the player pulse relay, and also opens contacts 133 to return coin-set relay 120 to its de-energized state.

Normally open contacts 116 of coin relay 110 are connected between the positive source and one end of reset windings 272 and 282. The other ends of these windings are connected to ground. Therefore, each time coin switch 91 is actuated contacts 116 are closed to energize the reset windings of stepping switches 270 and 280. The stepping switches return to their initial positions thereby resetting the scores to zero.

Dart game

The concept of scoring an animated game in accordance with the time at which a player switch is actuated while an object is in its trajectory toward a target area, is applicable to many types of games other than the horseshoe game. For example, the concept can be used in conjunction with a display panel as shown in FIG. 5 to provide a simulated dart game.

This display panel is controlled by the same control circuits previously described with respect to FIGS. 2 and 3. Contact banks A and B of the main stepping switch, and contact banks J and K of stepping switches 270 and 280 are reproduced in FIG. 5 to show the connections between the various electroluminescent panels of the control circuits. Also, terminal strips X and Y are reproduced to show connections of the electroluminescent panels in the target area to the various portions of the control circuits.

Two cartoon characters 300 and 301 are shown on the display which, when animated, appear to throw darts toward a target shown on the other side of the display panel. An electroluminescent panel 302 forms the body portion of cartoon character 300 and is connected to terminal X–1 so that it becomes energized while the character is in play. The individual electroluminescent panels 303–307 show the character's arm in five different positions and are connected to contacts A–1 through A–12. More specifically, contacts A–1, A–5 and A–11 are connected to panel 304, contacts A–2, A–4, A–6 and A–10 are connected to panel 305, contacts A–3, A–7 and A–9 are connected to panel 306, contact A–8 is connected to panel 307 and contact A–12 is connected to panel 303. As the main stepping switch advances through the first twelve positions, cartoon character 300 appears to first take a short swing back, then a short swing forward, a full swing back, and finally a full swing forward at which time the dart is released. Electroluminescent panels 308 through 320 are connected to contacts A–13 through A–25, respectively, so that the panels are energized successively to present a display which simulates the flight of a dart toward a target area 326.

The scoring circuits will energize a selected one of terminals X–2 through X–5 depending upon the time at which the player push button switch is actuated during the simulated flight of the dart toward the target. Electroluminescent panels 321 through 324, when energized, each show a dart in the target area. Panel 324 shows a dart in the bull's eye area of target 326 worth three points; panel 323 shows a dart in the middle ring of the target worth two points; and panel 322 shows a dart in the outer ring worth one point. Electroluminescent panel 321 shows the dart just outside the target area and indicates a miss. Contacts K–1 through K–9 are connected to electroluminescent panels 325 to indicate the first player's score.

If the player switch is actuated when the main stepping switch is in the twentieth position, panel 324 is illuminated via terminal X–5 and three points are added to the player's score as indicated on panel 325. If the switch is actuated when the main stepping switch is in the twenty-first position, panel 323 is illuminated and two points are added to the score, whereas if the player switch is actuated while the main stepping switch is in the eighteenth position, panel 323 is energized and only one point is added to the score. If the player fails to actuate the player switch while the main stepping switch is in either the eighteenth, twentieth or twenty-first positions, panel 321 is energized to show the miss.

With respect to cartoon character 301, terminal Y–1 is connected to an electroluminescent panel 302 forming the body portion of the character. Contacts B–1 through B–12 are connected to electroluminescent panel 333 through 337 which display the five individual arm positions for the cartoon character. Contacts B–12 through B–25 are connected to electroluminescent panels 338 through 350, respectively. Thus, when the B contact bank of the main stepping switch is energized, cartoon character 301 appears to first wind up, and then throw the dart toward the target area as the main stepping switch advances through its twenty-six positions.

Contacts J–1 through J–9 are connected to electroluminescent panels 355 to indicate the second player's score. Terminals Y–2 through Y–5 are connected to electroluminescent panels 351 through 354, respectively, to show the various possible positions for the second player's darts after reaching the target area.

In the completed apparatus the control circuits are housed in a suitable unit 360 as shown in FIG. 6 and are connected to the display panel by means of a cable 364. The control circuits are controlled from a remote control unit 361 which includes a coin slot 362 and a push button 363 associated with the player switch. The remote control unit is coupled to the control circuits by means of a suitable transmitter-receiver system.

Thus, it can be seen that many different types of games properly fall within the scope of this invention. The invention is more particularly defined in the appended claims.

What is claimed is:

1. Amusement apparatus comprising display panel means disposed for view by players; means defining a target area on said display panel means; first illuminating means associated with said display panel means to provide thereon an illuminated display simulating the movement of an object toward said target area; second illuminating means associated with said display panel means to provide thereon an animated character display; player operated means actuatable by the player; first electrical circuit means operatively connected to control said first and second illuminating means so that said character appears to wind-up and then throw said object toward said target area in response to an actuation of said player operated means; third illuminating means associated with said display panel means to provide thereon a plurality of illuminated displays each representing a different condition which could exist when said object reaches said target area; and second electrical circuit means controllable by the player and operative via said third illuminating means to present a selected one of said conditions.

2. Amusement apparatus in accordance with claim 1 wherein said second electrical circuit means is coupled to said player operated means so that said selected condition presented via said third illuminating means is in accordance with the time in which said player operated means is actuated during said simulated movement of said object toward said target area.

3. Amusement apparatus in accordance with claim 1 comprising a plurality of individually energizable electroluminescent panels and wherein said first, second, and third illuminating means achieve their respective displays by energizing selected ones of said electroluminescent panels.

4. Amusement apparatus comprising a pair of display panels disposed for view by the players; means defining a target area on one of said display panels; first illuminating means associated with the other one of said display panels to provide thereon an animated character display; second illuminating means associated with both of said

display panels to provide thereon an illuminated display simulating the movement of an object from said character to said target area; electrical circuit means operatively connected to control said first and second illuminating means so that said character appears to wind-up and throw said object out of said one display panel and so that said object thereafter appears to enter said other display panel and continue toward said target area in one continuous trajectory; variable time delay circuit means connected to said electrical circuit means to vary the time interval during which the simulated object appears between display panels; and a player operated means actuatable by the player and scoring apparatus adapted to score the maximum score for the play when said player operated means is actuated just after said object appears to enter said one display panel.

5. Amusement apparatus in accordance with claim 4 wherein said simulated object resembles a horseshoe, said target resembles a horseshoe pit and said animated character appears to throw a horseshoe toward said horseshoe pit.

6. Amusement apparatus comprising a pair of display panels disposed for view by the players; means defining a target area on each of said display panels; a plurality of separately energizable electroluminescent panels shaped and located so that an animated character can be displaced on each of said display panels and so that the movement of an object from said characters to the target area on the other of said display panels can be simulated; player operated means actuatable by the players; control circuit means connected to said electroluminescent panels and operable to animate one of said characters and then simulate the movement of said object to the target area on the other display panel in response to a first actuation of said player operated means, and to thereafter animate the other of said characters and then simulate the movement of said object back to the target area of the first one of said display areas in response to an actuation of said player operated means, whereby said object appears to be thrown back and forth between said display panels upon successive actuations of said player operated means.

7. Amusement apparatus in accordance with claim 6 wherein said target areas resemble horseshoe pits and said characters appear to throw a horseshoe back and forth between said horseshoe pits.

8. Electrical horseshoe game apparatus comprising display panel means disposed for view by the players; means suggesting the position of a horseshoe pit on said display panel means; a first plurality of separately energizable electroluminescent panel members arranged so that an animated character winding-up to throw a horseshoe can be presented on said display panel means by energizing said panel members sequentially; a second plurality of separately energizable electroluminescent panel members arranged so that the flight of a horseshoe from said character to said horseshoe pit can be simulated on said display panel means by energizing selected panel members sequentially; a third plurality of separately energizable electroluminescent panel members arranged to stimulate a ringer, a leaner and a close-shoe within said horseshoe pit, and a horseshoe outside said pit; electrical circuit means connected to sequentially energize said electroluminescent panel members so that said character first appears to wind-up and then appears to throw said horseshoe toward said horseshoe pit; and a player actuatable switch means connected so that the panel member selected by said player controllable circuit means is selected in accordance with the time at which said switch means is actuated during a simulated flight.

9. Horseshoe game apparatus in accordance with claim 8 wherein said display panel means includes a first and a second display panel, said first plurality of electroluminescent panel members being part of said first display panel, said suggested horseshoe pit being on said second display panel, and said second electroluminescent panel members being split between said display panels.

10. Horseshoe game apparatus in accordance with claim 9 further comprising means suggesting a horseshoe pit on said first display panel, a plurality of additional electroluminescent panels arranged to present a second animated character on said second display panel, and a plurality of additional electroluminescent panels arranged to simulate the flight of a horseshoe from said second character to said horseshoe pit on said first display panel, said electrical circuit means being operably connected to sequentially energize said additional electroluminescent panel members.

11. Horseshoe game apparatus in accordance with claim 8 further comprising scoring apparatus for maintaining the players' total score, and means for adding to said total score a number of points related to the particular one of said panel members which is energized at the end of each simulated flight.

12. Horseshoe game apparatus in accordance with claim 8 wherein said switch means is also connected to said electrical circuit means so that a simulated flight will be initiated by a player actuation of said switch means.

13. Horseshoe game apparatus in accordance with claim 8 further comprising a radio transmitter-receiver system for coupling said player actuatable switch means to said circuit means.

14. Horseshoe game apparatus in accordance with claim 13 further comprising coin-operated switch means so that player actuatable switch means is operative only after coins of the proper denomination have been deposited to actuate said coin-operated switch means.

15. Electrical dart game apparatus comprising display panel means disposed for view by the players; means suggesting the outline of a target for darts; a first plurality of separately energizable electroluminescent panel members arranged so that an animated character winding-up to throw a dart can be presented on said display panel means by energizing selected panel members sequentially; a second plurality of separately energizable electroluminescent panel members arranged so that the flight of a dart from said character to said target can be simulated on said display panel means by sequentially energizing said panel members; a third plurality of separately energizable electroluminescent panel members arranged to simulate a dart at various positions in said target; electrical circuit means connected to sequentially energize said electroluminscent panel members so that said character first appears to wind-up and then appears to throw said dart toward said target; player controllable circuit means for energizing a selected one of said third plurality of panel members at the end of each simulated flight; and player actuatable switch means connected so that the panel member selected by said player controllable circuit means is selected in accordance with the time at which said switch means is actuated during a simulated flight.

16. Dart game apparatus in accordance with claim 15 further comprising additional electroluminescent panel members selectively energized by said electrical circuit means and arranged so that a second animated character and the simulated flight of a dart from said second character to said target can be displayed.

17. Dart game apparatus in accordance with claim 15 further comprising scoring apparatus for maintaining the players' total score, and means for adding to said total score a number of points related to the particular one of said panel members which is energized at the end of each simulated flight.

18. Dart game apparatus in accordance with claim 15 wherein said switch means is also connected to said electrical circuit means so that a simulated flight will be initiated by a player actuation of said switch means.

19. Dart game apparatus in accordance with claim 18 further comprising a radio transmitter-receiver system for

coupling said player actuatable switch means to said circuit means.

20. Dart game apparatus in accordance with claim 19 further comprising coin-operated switch means so connected that player actuatable switch means is operative only after coins of the proper denomination have been deposited to actuate said coin-operated switch means.

21. Amusement apparatus comprising display panel means disposed for view by the players; means defining a target area on said display panel means; a first plurality of separately energizable electroluminescent panel members arranged so that by sequential energization, an animated character winding-up to throw an object can be presented on said display panel means; a second plurality of separately energizable electroluminescent panel members arranged so that, by sequential energization, the movement of said object from said character to said target area can be simulated on said display panel means; a third plurality of separately energizable electroluminescent panel members arranged to display said object at various different positions in said target area; electrical pulse generating circuit means; player actuatable switch means for rendering said pulse generating circuit means operative in responsive to a switch actuation; multiple position digital selector means operative to change position in response to each successive pulse from said pulse generating circuit means, said selector means being operatively connected to first sequentially energize panel members of said first plurality and thereafter sequentially energize panel members of said second plurality; circuit means operably connected to energize a selected one of said third plurality of panel members when said digital selector means completes a stepping sequence, said last named circuit means being conditioned to energize a predetermined one of said third plurality of panel members if said switch means is actuated when said digital selector means is in a certain position.

22. Amusement apparatus in accordance with claim 21 further comprising circuit means for controlling said pulse generating circuit means in accordance with the position of said selector means so that pulses are generated at one rate while panel members of said first plurality are being energized and at a different rate while panel members of said second plurality are being energized.

23. Amusement apparatus in accordance with claim 21 further comprising variable time delay circuit means coupled to said selector means to vary the dwell time associated with one of the positions of said selector means which occurs during the sequence in which said second plurality of panel members is energized.

24. Amusement apparatus in accordance with claim 23 wherein said display means includes a first and a second display panel, said first plurality of panel members being part of said first display panel, said target area being part of said second display panel, and said second plurality of panel members being split between said first and second display panels so that said object appears to move out of said first display panel and, after the pause caused by said variable dwell time, enters said second display panel.

References Cited

UNITED STATES PATENTS

2,187,422	1/1940	Henry.	
2,300,132	10/1942	New	273—101.2
2,404,653	7/1946	Plebanek.	
2,458,892	1/1949	Burdick	273—1
3,012,779	12/1961	Friedman	273—1
3,269,731	8/1966	Koci	273—85

FOREIGN PATENTS

900,104	7/1962	Great Britain.

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