United States Patent

[11] 3,604,707

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[54] **ELECTRIC DART GAME AND THE LIKE**
5 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **273/85 R,** 40/106.52
[51] **Int. Cl.** **A63f 9/00**
[50] **Field of Search** ..... 273/85 G, 1 E, 101.1

[56] **References Cited**

UNITED STATES PATENTS

3,337,218 8/1967 Hurley ..... 273/85 G

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ABSTRACT: An electronic amusement game is provided having a wall-mounted display panel. Such wall-mounted display panel may be selectively illuminated to provide animation for the amusement game. Remote control means including a coin transmitter and a play transmitter are radio coupled to receiver and control circuit means. The remote control means are actuated by insertion of coins and by actuation of the play transmitter. Actuation of the play transmitter two consecutive times energizes the receiver and control circuit means to show on the display panel the position of a simulated object in a target area. The length of time between the two actuations determines the exact final location of the simulated object. Such receiver and control circuit means also provide a score indication and terminate the game after a certain score has been attained.

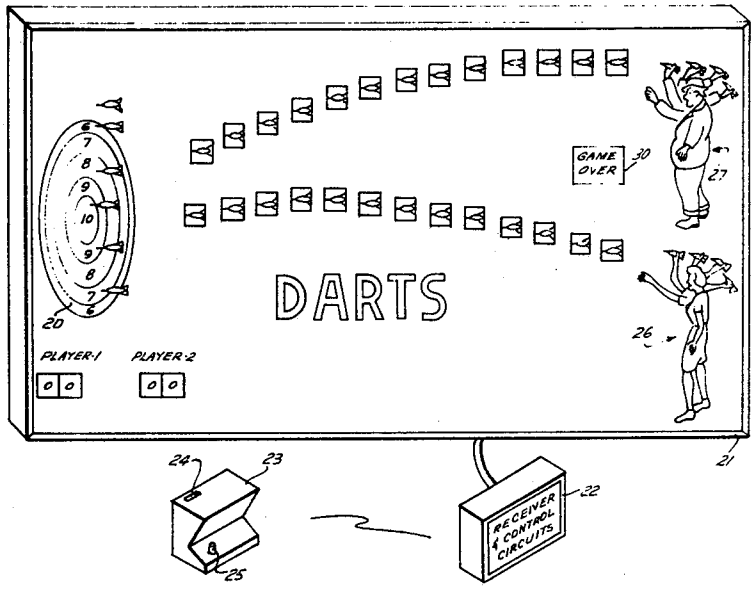
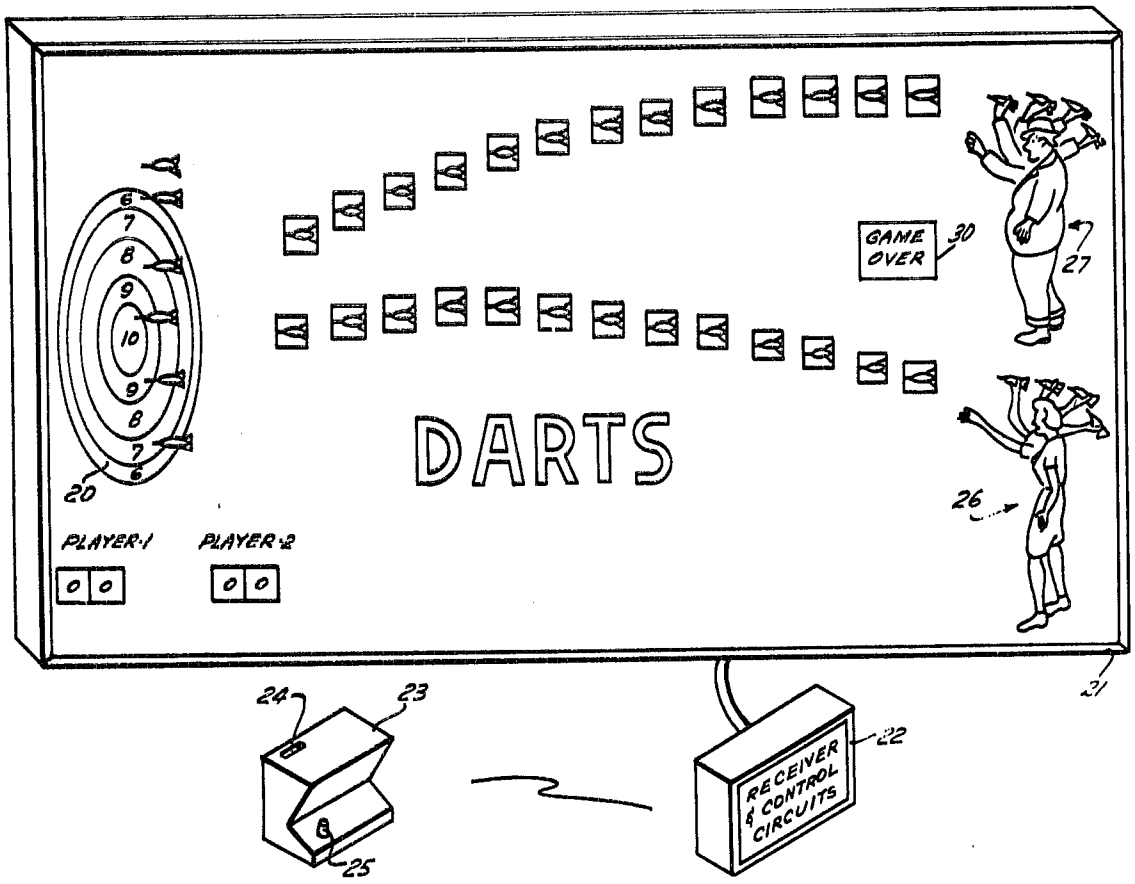


FIG. 1



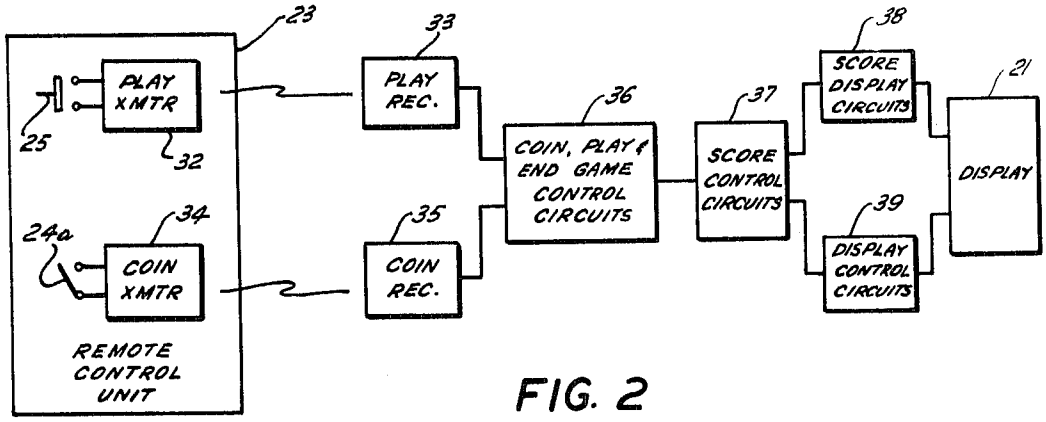


FIG. 2

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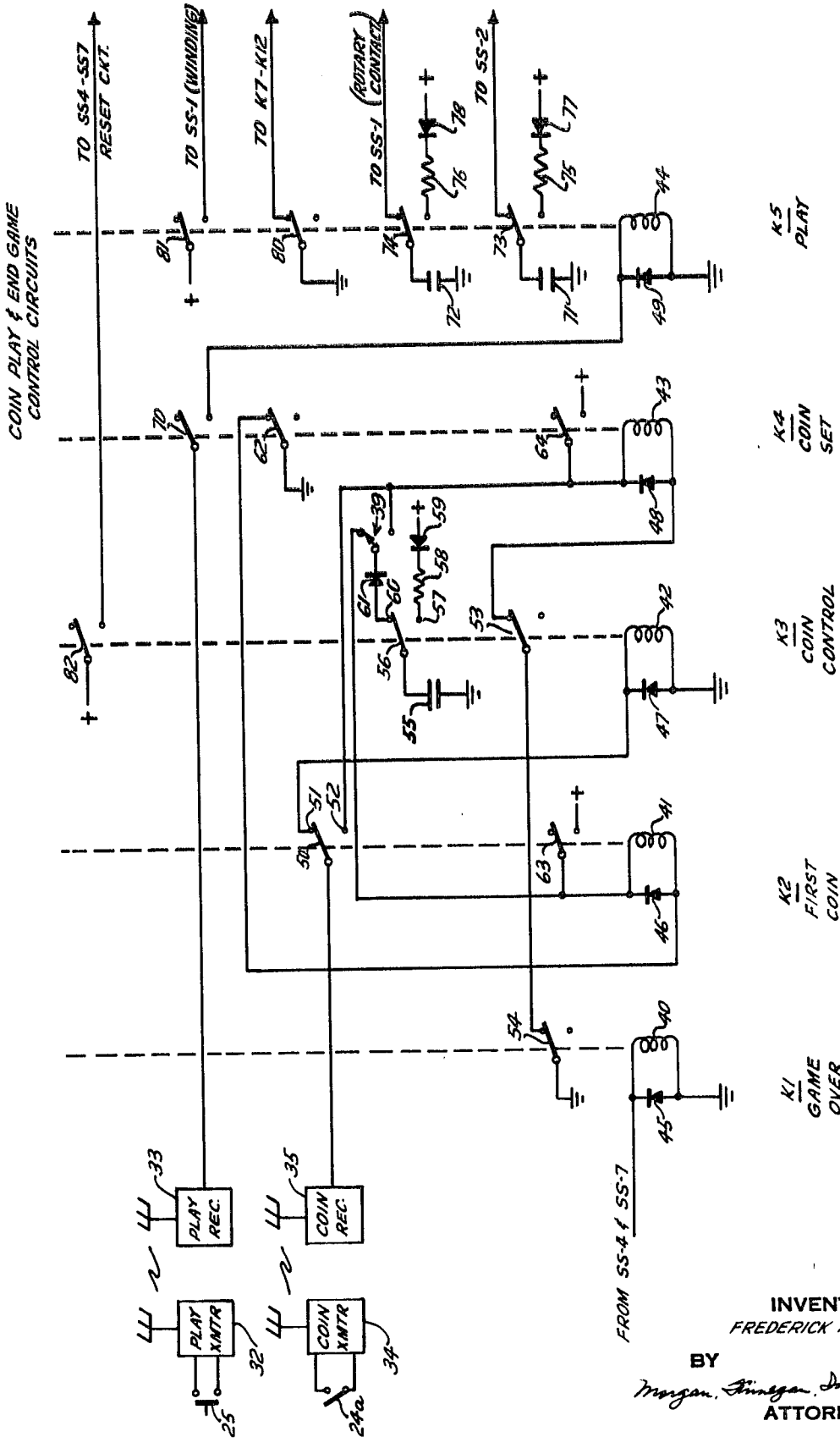

FIG. 3

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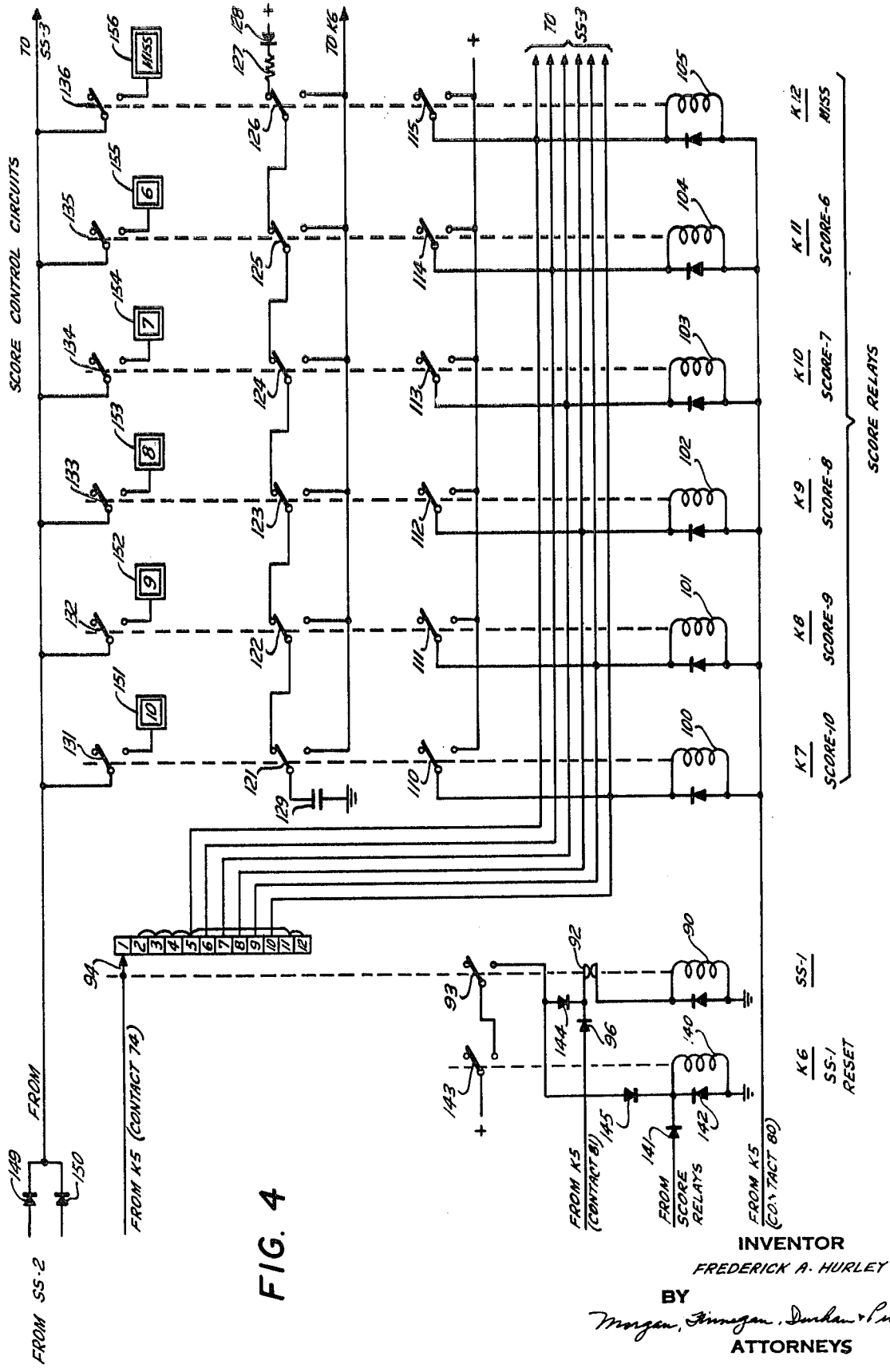

FIG. 4

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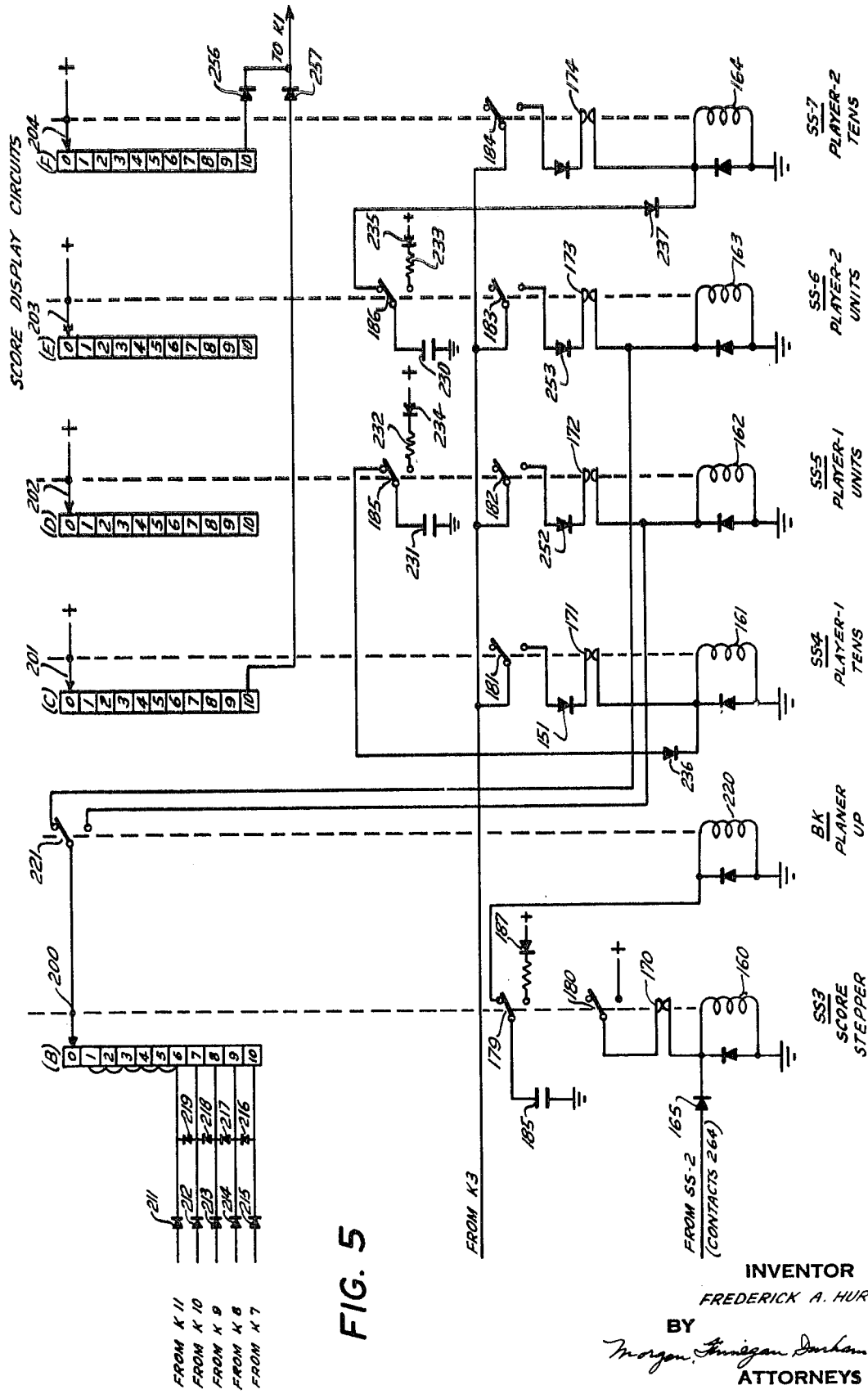

FIG. 5

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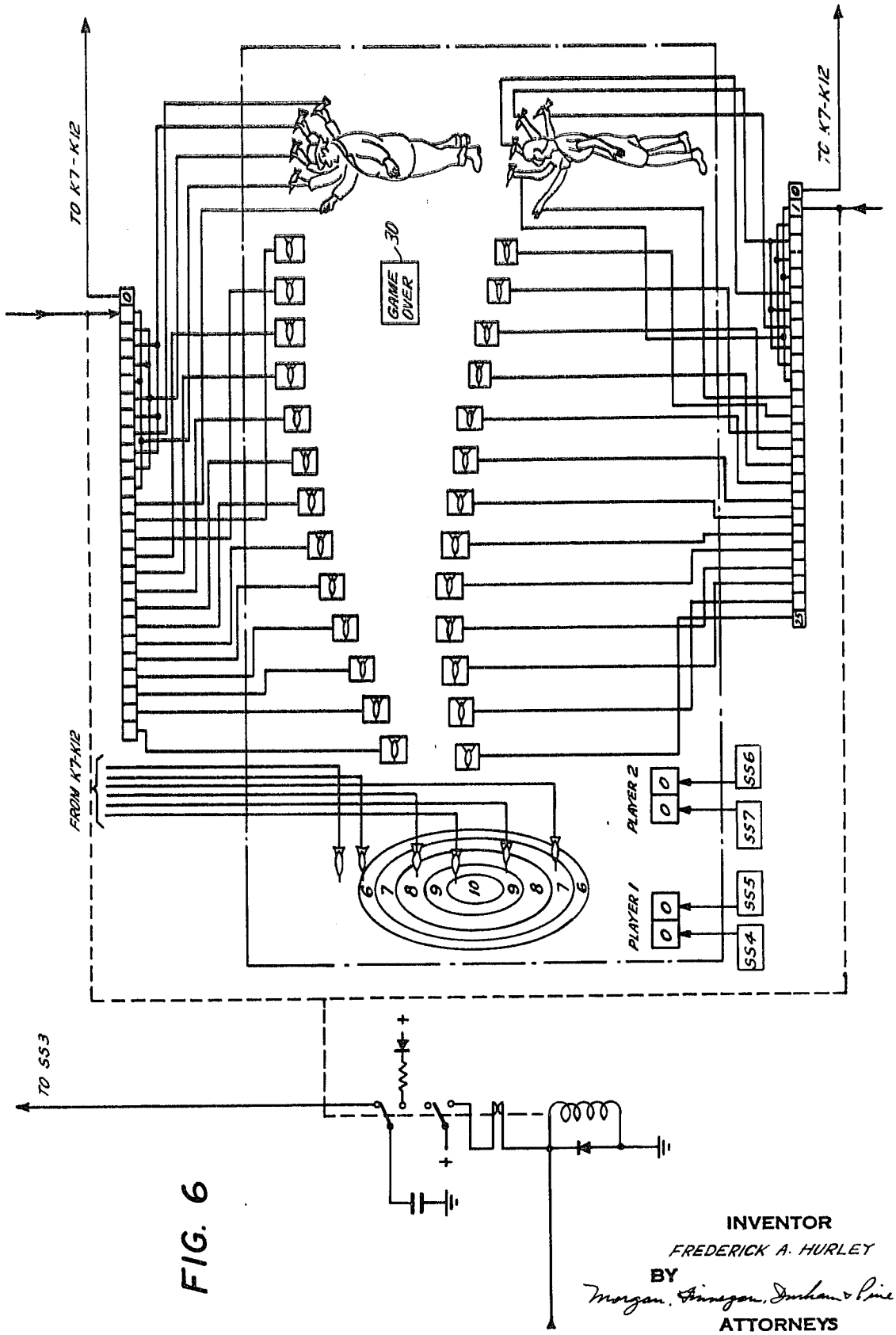

FIG. 6

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ELECTRIC DART GAME AND THE LIKE

the play transmitter two consecutive times energizes the receiver and control circuit means to show on the display panel the position of a simulated object in a target area. The length of time between the two actuations determines the exact final location of the simulated object. Such receiver and control circuit means also provide a score indication and terminate the game after a certain score has been attained.

BACKGROUND OF THE INVENTION

This invention relates to amusement apparatus, and while not limited thereto, relates to a remotely controlled game apparatus including a selectively illuminated display which may be wall mounted and upon which a game can be simulated wherein an object is thrown toward a target area.

In the past, most coin-operated amusement devices were of a generally mechanical nature and, therefore, required a horizontal playing surface. Because of this horizontal playing surface, substantial floor space was 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 of the establishment.

In a prior U.S. Pat. No. 3,337,218issued to Frederick A. Hurley on Aug. 22, 1967, a remote control, wall-hung game apparatus is disclosed suitable for simulating either a horseshoe game or a dart game. With this game, when a player-actuated pushbutton 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 pushbutton 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.

Accordingly, it is an object of this invention to provide an amusement game which more faithfully simulates a true dart game or other similar games wherein an object is thrown toward a target area.

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

Another object is to provide amusement apparatus including unique scoring techniques but which is based upon well-known games and can, therefore, be played without the need for special instructions.

BRIEF SUMMARY OF THE INVENTION

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 games. Some examples include throwing darts, pitching horseshoes, basketball, fowl shooting, bowling, and hole-in-one golf. 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 is arranged so that it may be selectively illuminated to provide the desired animation for the game. The game is controlled remotely from a unit which collects the coins for actuating the game and which also includes a player pushbutton for controlling the game. Control over a particular simulated throw of the object is achieved by detecting the length of time during which the pushbutton is actuated prior to the release of the object. An indication corresponding to this detected time interval is stored and used later to determine the point at which the simulated object strikes the target, and to also determine the score to be received by the player. If the player pushbutton is actuated for too long a period of time, or for too short a period of time, a miss is registered, whereas if the pushbutton is actuated for the appropriate length of time the player will score a hit.

BRIEF DESCRIPTION OF THE DRAWINGS

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 an illustrative embodiment of the invention. The drawings form a part of this specification, wherein:

FIG. 1 is a prospective view illustrating the display panel for a dart game along with the associated control circuits and remote control unit;

FIG. 2 is a block diagram illustrating the basic layout of the control circuits for the game;

FIG. 3 is a schematic diagram illustrating the coin, play and end game control circuits;

FIG. 4 is a schematic diagram illustrating the score control circuits for the game;

FIG. 5 is a schematic diagram illustrating the score display circuits for the game; and

FIG. 6 is a schematic diagram illustrating the display control circuits for the game.

GENERAL DESCRIPTION OF THE GAME APPARATUS

In the illustrative embodiment a dart game has been selected for simulation. Normally the game is played by two players who alternate throwing darts at a target board. The number of darts thrown before alternating players, and the scoring of the game, varies according to local tradition and the desires of the players. The game apparatus, according to the invention, could be set up to simulate any desired dart game variation, but, for the illustrative embodiment, the game is simulated with the players alternating after each throw of the dart and the target area **20** is arranged to register scores of 10, nine, eight, seven, six or miss.

As shown in FIG. **1**, the dart game apparatus includes a display unit **21**, a unit for housing the control circuits, and a remote control unit **23**, which is coupled to the control circuits by means of a radio receiver-transmitter system.

Each time a coin of the proper denomination is deposited via coin slot **24** of remote control unit **23**, a pulse is transmitted to the control circuits **22** so that when the proper monetary amount has been deposited the game is activated. Thereafter, each time pushbutton **25** of the remote control unit is depressed, a signal is transmitted to the control circuits as long as the pushbutton is depressed. The control circuits detect the length of time during which the pushbutton is depressed and momentarily store this indication. When the push button is released, one of the animated figures **26** or **27** appears to wind up and then release the dart which follows one or the other of the paths **28** or **29**. Ultimately, the simulated dart will come to rest in the target area at a position determined according to the length of time during which the player actuated the pushbutton switch prior to the beginning of the trajectory. The dart will appear in a position registering either a score from 10down to six or a miss, this indication being given in the target area **20**. Upon the next actuation of the pushbutton switch, the duration of the actuation is momentarily stored, the other player winds up and throws the dart after termination of the actuation, and the player's dart is then displayed in the target area. The game proceeds in this manner registering the scores for the players until one player reaches a full score. This This condition is detected to provide a game over indication **30**.

FIG. **2** illustrates the basic layout for the control circuitry. The remote control unit **23** includes a pair of transmitters **32** and **34** designated as the "play" and "coin" transmitters respectively. The remote control unit also includes a coin box so that when a coin of the proper denomination is deposited the switch **24***a* will be closed to actuate the "coin" transmitter. The player pushbutton **25** is coupled to the "play" transmitter **32** and transmits a signal whenever the pushbutton is depressed. The transmitters are coupled to corresponding "play" and "coin" receivers **33** and **35** respectively. These receivers include a set of contacts which are closed while a signal is being received. Although two separate transmitters

and receivers are shown in the illustration, where convenient, a twoichannel transmitter-receiver system could be employed.

The "play" and "coin" receivers **33** and **35** are coupled to a coin, play and end game control circuit **36** which is shown schematically in FIG. **3**. These circuits respond to the coin indications which activate the game when the proper monetary amount has been deposited. The circuits also provide the various "play" signals in response to actuation of the player pushbutton **25** and, in additions, deactivate the game when one of the players has reached a full score.

Circuits **36** are coupled to the score control circuits **37** which are shown schematically in FIG. **4**. The score control circuits detect the length of time during which the player pushbutton is actuated and store a corresponding indication which is used subsequently to provide the appropriate dart display in the target area and to obtain the proper score for each player. The score control circuits also provide a signal upon termination of the player pushbutton actuation to initiate animation of the cartoon figures and the trajectory of the dart toward the target area.

The score control circuits **37** are coupled to the score display circuits **38** which are shown schematically in FIG. **5** The score display circuits control not only the display of the players'score but also accumulate the points for the respective players. The accumulated score appears on display unit **21**.

Score control circuits **37** are also coupled to display control circuits **39** which are illustrated schematically in FIG. **6**. The display control circuits directly control the movement of the animated figures and control display of the simulated dart movement toward the target area. Suitable connections are made between display control circuits **39** and display unit **21** for control of the simulated movements.

COIN, PLAY AND END GAME CONTROL CIRCUITS

The coin, play and end game control circuits are shown in FIG. **3** and include five electromagnetic relays K1–K5, each relay including one of the energizing windings **40–44** respectively. A diode **45** is connected across winding **40** to absorb the inductive kick when energization of the winding is terminated, and diodes **46–49** are similarly connected across windings **41–40**.

Since there are two players for the game, it is desirable that the control circuits be adjustable to require either one coin for both players or two coins, one coin for each of the players. This selection as to the number of coins required for activating the game is achieved through a two position switch **39** which will be described in more detail hereinafter.

The contacts of "coin" receiver **35**, when closed, couple the positive source to a moveable contact **50** of the "first coin" relay K2. The associated normally closed stationary contact **51** is coupled to energizing winding **42** of "coin control" relay K3, the other end of the winding being coupled to ground. The normally open contact **52** of the K2 relay is coupled to the energizing winding **43** of "coin set" relay K4. A holding circuit for "coin set" relay K4 is completed through normally open contacts **64** which couple one end of winding **43** to the positive source, and through the normally closed contacts **53** and **54** of relays K3 and K1, respectively, which couple the other end of winding **43** to ground.

"Coin control " relay K3 is arranged to provide a pulse upon deenergization, this being achieved by means of a capacitor **55** coupled between the movable contact **56** and the K3 relay and ground. The associated normally opened contact **57** is coupled to the positive source via a resistor **58** and a diode **59**. The normally closed stationary contact **60** is coupled to the movable contact of switch **39** via a diode **61**. When the switch **39** is in the position shown, the movable contact is coupled to one end of winding **41** of "first coin" relay K2. A holding circuit for the K2 relay is completed via normally open contacts **63** of the relay which couple one end of winding **41** to the positive source, and by means of normally closed contacts **62** of the K4 relay, which couple the other end of winding **41** to ground.

With this circuit arrangement, when the contract of "coin" receiver **35** are closed momentarily, a signal passes via movable contact **50** to momentarily energize winding **42** of the K3 relay. When the K3 relay is energized capacitor **55** is charged and thereafter, when the relay is deenergized, capacitor **55** is discharged via movable contact **56**, diode **61**, switch **39** to energize winding **41** of "first coin" relay K2. Once the K2 relay is energized, it is maintained in the energized state by means of the holding circuit completed via contacts **63** of the K2 relay and contacts **62** of the K4 "coin set" relay.

The second actuation of "coin" receiver **35** causes a pulse to pass through movable contact **50**, but this second "coin" pulse, instead of going to "coin control" relay K3, is routed to "coin set" relay K4 via stationary contact **52** of the K2 relay. Winding **43** is energized and thereafter maintained in the energized state by means of the holding circuit completed through its own contacts **64** as well as contacts **53** and **54** of relays K3 and K1 respectively. When the "coin set" relay is energized it should be noted that contacts **70** couple the "play" receiver **33** to "play" relay K5 and it is this connection which activates the game control circuits or, in other words, which permits operation of "play" relay K5.

If switch **39** were thrown to the position opposite that shown in FIG. **3**, the control circuits would be activated after the first "coin" signal passes via movable contact **50** to momentarily energize the K3 relay, which, in turn, generates a pulse upon the discharge of capacitor **55** which passes directly to "coin set" relay K4 instead of "first coin" relay K2. When the K4 relay is momentarily energized, it is maintained in the energized state via the holding circuit including contacts **64**, **53** and **54** and, hence, the game is activated in response to deposit of the first coin.

Stepping switches SS4 through SS7 shown in FIG. **5** and described hereinafter serve to accumulate the players score and control display thereof on display panel **21**. It is desirable that the players'score remain on the display panel after termination of a game and until a new game commences. Movable contact **82** of "coin control" relay K3 is connected to the positive source and the associated normally closed stationary contact is coupled to the stepping switches SS4 through SS7 to reset these circuits upon depositing of a coin indicating the commencement of a new game.

The K5 "play" relay generates various signals which are utilized to control other components in the system. The movable contact **81** coupled to a positive source of supply, and the associated normally open contact is coupled to the main stepping switch SS1 (FIG. **4**) which detects the duration during which pushbutton switch **25** is actuated. **180–**

Movable contact **80** of the K5 relay is coupled to ground and the associated normally closed contact is coupled to the score relays K7—K12 in FIG. **4** to reset these relays upon each player actuation. The movable contacts **73** and **74** are each utilized to generate pulses upon deenergization of the "play" relay. Capacitors **71** and **72** are connected between movable contacts **73** and **74**, respectively, and ground. The associated normally open contacts are coupled to the positive source via resistors **75** and **76** and diodes **77** and **78**, respectively. The normally closed stationary contact associated with movable contact **73** is connected to actuate the "display stepper" SS2 (FIG. **6**) which controls the animated characters and dart trajectory on the display panel. The normally closed contact associated with movable contact **74** is coupled to the rotary contact of stepping switch SS1 to transfer the store information from stepping relay SS1 to the "score" relays.

The various functions achieved by means of relay K5 will be described in more detail in following sections.

Score Control Circuits

The score control circuits are illustrated schematically in FIG. **4** and include a stepping switch SS1 which is utilized to detect the time period during which pushbutton switch **25** is actuated, and also includes a set of score relays K7 through K12 which serve to store this information until the end of the

dart trajectory on the display panel. An additional relay K6 is used to reset stepping switch SS1 after the data has been transferred from the stepper switch to the score relays.

Stepping switch SS1 includes an actuating winding 90 having a diode 91 connected across the winding to absorb the inductive kick when energization of the winding is terminated. The stepping switch also includes an array of stationary contacts A, these contacts being numbered 1–12 indicating the 12 successive positions of the associated movable contact 94. The movable contact advances one step each time winding 90 is energized. The interrupter contacts 92 momentarily open each time the movable contact advances to the next successive stationary contact. The off-normal contacts 93 are in the normal position as shown in FIG. 4 when the stepping switch is in the home position, i.e. with the movable contact in contact with the first stationary contact. In any other position of the movable contact the off-normal contacts 93 are in the position opposite that shown in FIG. 4 and, hence, there contacts can be utilized to terminate energization of the stepping switch when the movable contact is in the home position.

The positive source is coupled to one end of winding 90 of stepping switch SS1 via normally open contacts 81 of "play" relay K5 (FIG. 3), as well as a diode 96 and the interrupter contacts 92. Thus, when the positive potential is applied to winding 90 it is energized and moves the movable contact one position, at which time the interrupter contacts open so that when they subsequently close another pulse is applied to the energizing winding and it advance another step. Accordingly, the stepping switch will continue to automatically advance, stepping from position to position, so long as the positive potential is supplied via the K5 "play" relay. Since the K5 relay in turn is energized for the duration of the pushbutton switch actuation, it follows that the stepping switch will advance a number of stages corresponding to the duration of the pushbutton actuation.

Information indicating the position of the SS1 stepping switch is subsequently transferred to the "score" relays where the information is stored throughout the trajectory of the dart toward the target. Contacts 2, 3, 4, 5, 11 and 12 of the "A" stationary bank of contacts are connected together and are also connected to energizing winding 105 of the "miss" relay K12. The sixth, seventh, eighth, ninth and 10th contacts, respectively, of stationary contact bank A are connected to energizing windings 104, 103, 102, 101 and 100 of relays K11, K10, K9 K8 and K7 respectively. A diode is connected across each of these windings to absorb the inductive kick. A set of normally open contacts 110–115 of each of the relays, K7–K12 provides a holding circuit for the relay, these normally open contacts being connected between the positive source and one end of the associated energizing winding, the other end of the energizing windings being coupled to ground via normally closed contacts 80 of the K5 "play" relay (FIG. 3). Movable contact 94 of stepping switch SS1 is coupled to the stationary normally closed contact associated with movable contact 74 of the K5 "play" relay.

Accordingly, upon deenergization of the K5 "play" relay, the position information is transferred from the stepping switch to the score relays. This is achieved when the K5 relay is deenergized to discharge capacitor 72 via movable contact 74 and movable contact 94 from where the pulse travels to a selected one of the energizing coils 100–105 of "score" relays K7–K12. The pulse momentarily energizes the appropriate one of the relays which is thereafter held in the energized state via the holding circuit associated with that relay.

Once the data has been transferred to the score relays it is desirable to reset the stepping switch SS1, this being achieved via contacts 121–126 of relays K7–K12, respectively, and relay K6 which is the "SS1 reset" relay. More specifically, the normally closed contacts of relays K7–K12 are connected in series between a capacitor 129 and a charging resistor 127. Charging resistor 127 is connected to the positive source via a diode 128, and the capacitor is connected to ground. Accordingly, when all of the relays are in the deenergized state, as shown in FIG. 4, capacitor 129 is charged via resistor 127 and the normally closed contacts 121–126. The normally open stationary contacts associated with movable contacts 121–126, are each connected to energizing winding 140 of "reset" relay K6 via a diode 141. A positive source is coupled to the movable contact 93 of the off-normal contacts of stepping switch SS1 via normally closed contacts 143 of relay K6. The normally open off-normal contact of the stepping switch is coupled to the interrupter contacts 92 via diode 144 and is also coupled to winding 140 of relay K6 via a diode 145. A diode 142 is connected across winding 142 to absorb the inductive kick.

When any one of the relays K7–K12 become energized, the associated movable contacts 121–126 will complete a circuit from capacitor 129 to winding 140 of "reset" relay K6. Accordingly, the capacitor 129 will discharge to momentarily energize winding 140. When relay K6 is energized current flows through contacts 143 and 93 to thereby energize winding 90 of the stepping switch via diode 144 and interrupter contacts 92, and to also maintain winding 140 of reset relay K6 in the energized state by means of current flow through diode 145. In this manner, the stepping switch is repeatedly energized through pulses created by the interrupter contacts 92 until such time as the stepping switch reaches the home position. At that point the off-normal contacts 93 return to their normally open position thereby interrupting the holding circuit for winding 140 which had been maintained via contacts 93 and 143. As a result, "reset" relay K6 returns to the deenergized state.

Movable contacts 131–136, respectively, of "score" relays K7–K12 are utilized to control the dart indication in the target area at the end of the dart trajectory. The dart trajectory on the display panel is controlled by a second stepping switch SS2 as shown in FIG. 6 which provides a signal at the end of the dart trajectory, this signal passing into FIG. 4 via diodes 149 and 150. The cathodes of the diodes are coupled to the movable contacts 131–136. The associated normally open stationary contacts are connected to the display units 150–156. For convenience, these display units are shown on FIG. 4 as indicating the score which will be registered on the display panel according to the illuminated position of a dart. Accordingly, if score relay K7 was energized by operation of stepping switch SS1, thereafter, when the signal passes via diodes 149 and 150 at the end of the dart trajectory, relay K7 would be energized and therefore the signal would flow via movable contact 131 to illuminate a score of 10 indication in the target area. Similarly, if relay K8 was energized the signal would pass via movable contact 132 to illuminate indicator 152 and similarly if relays K9–K12 were energized the signal would pass via the associated one of movable contacts 133–136 to illuminate the indicators 153–156 respectively.

In summary, the operation of the score control circuits in FIG. 4 takes place in response to depressing the player pushbutton 25 which in turn energizes "play" relay K5 for a corresponding period of time. Upon energization of the "play" relay, the "score" relays K7–K12 are immediately reset by the momentary opening of contacts 80 and the stepping switch SS1 is energized via contacts 80. Accordingly, the stepping switch advances to a position corresponding to the length of time during which the pushbutton switch is actuated.

When the pushbutton switch is released and "play" relay K5 returns to the deenergized state, a pulse is generated via movable contacts 74 of the play relay which passes through movable contact 94 of the stepping switch and the corresponding stationary contact to energize a selected one of the score relays K7–K12. Accordingly, the information corresponding to the duration of the player pushbutton switch actuation is transferred from the stepping switch to the "score" relays. The selected "score" relay is then maintained in the energized state by means of a holding circuit completed through one of the contacts 110–115, as well as the normally closed contacts 80 of the play relay. When one of the play relays is energized a pulse is generated via one of the associated movable contacts

121–126 which discharges capacitor 129 to energize relay K6 which, in turn, resets stepping relay SS1.

In this manner, the score information is stored on the "score" relays. When the simulated dart reaches the target a signal passes through one of the movable contacts 131–136 to provide the appropriate final dart indication in the target area at the end of the trajectory. Also, the movable contacts 110–115 are connected to the "score stepper" relay SS3 (FIG. 5) which, in turn, will cause the score to be added to the appropriate players'total.

Score Display Circuits

The score display circuits are illustrated in FIG. 5 and include five stepping switches as well as a bistable relay. These circuits accumulate the total scores for each of the players. Since the score indications run from zero to 99 two stepping relays are required for each player. Stepping relay SS5 is the units accumulator for player No. 1 and stepping switch SS4 is the tens accumulator for player No. 1. Similarly, stepping switch SS6 is the unit accumulator for player No. 2 and stepping switch SS7 is the tens accumulator for player No. 2. Stepping switch SS3 converts the incoming information to a series of pulses suitable for activating the score accumulator stepping switches SS4–SS7 and bistable relay BK determines which player will receive the added score.

Stepping switches SS3 through SS7 are similar to stepping switch SS1 previously described in FIG. 4. Each of the stepping switches includes an energizing winding 160–164 respectively, each energizing winding having a diode connected in parallel to absorb the inductive kick. The associated interrupter contacts 170–174 open momentarily after each successive step, and off-normal contacts 180–184 are in the positions shown in the home position of the stepping switch but move to the alternate position when the stepping switch is in other than the home position. Stepping switch SS3 include a second set of off-normal contacts 179 and stepping switches SS5 and SS6 include additional sets of off-normal contacts 185 and 186. Each stepping switch includes a bank of stationary contacts B–F, respectively, each bank of contacts including 11 stationary contacts designated 0–10. The associated movable contacts 200–204 move one step upon each successive energization of the associated energizing winding 160–164.

The movable contacts 110–114 of the relays K7–K11 respectively (FIG. 4) are connected to the sixth through 10th stationary contacts of contact bank B of stepping switch SS3 via diodes 211–215 respectively, the cathodes of each of the diodes being connected to the respective stationary contact. Four diodes 216–219 are connected in series with the anode of diode 216 coupled to the cathode of diode 215 and the cathode of diode 219 coupled to the cathode of diode 211. The junctions between diodes 216–219 are connected respectively to the cathodes of diodes 214–212.

When stepping switch SS2 (FIG. 6) reaches the end of its stepping sequence corresponding to the end of the dart trajectory, a signal is generated which passes via diode 165 in FIG. 5 to energize winding 160. The normally open off-normal contacts 180 are coupled between the positive source and the interrupter contacts, the interrupter contacts in turn being connected to winding 160. The other end of winding 160 is connected to ground. Accordingly, when a first energizing pulse is applied to the winding via diode 165, the stepping switch advances one position and closes off-normal contacts 180. Thereafter, the interrupter contact 170 periodically opens the circuit and, therefore, successive pulses are applied to winding 160 causing the stepping switch to advance through the entire sequence and to return to the home position.

In advancing through the stepping sequence, stepping switch SS3 provides a series of pulses corresponding to the score indication stored on the energizing one of the "score" relays K7–K11. For example, if relay K10 were energized representing a score of seven, contacts 113 (FIG. 4) would be closed and, therefore, a positive potential would be applied to the seventh contact of contact bank B via diode 212 (FIG 5). A positive potential would also appear on the sixth contact because of current flow through diode 219, and would also appear on the fifth, fourth, third, second and first contacts by means of the jumper connections. Accordingly, seven of the contacts are energized and, therefore, as stepping switch SS3 advances through a stepping sequence, seven pulses are generated which appear on movable contact 200.

Bistable relay BK is in the nature of a two position stepping switch. In other words, upon each energization of energizing winding 220, the relay shifts to the alternate one of two possible positions and the associated contacts 221 remain in that position until the next subsequent energization of the energizing winding. Movable contact 200 of stepping switch SS3 is coupled to movable contact 221 of the BK relay. The stationary contacts, in turn, are connected to energizing winding 162 and 163 respectively of stepping switches SS5 and SS6. The bistable relay BK indicates which player is up and changes position with each successive tally. The circuit for changing the position of the bistable relay includes off-normal contacts 179 of stepping switch SS3. The movable off-normal contact 179 is coupled to ground via a capacitor 185. The normally opened contacts are connected to a positive source via a resistor 180 and a diode 187. Thus, while stepping switch SS3 is advancing through its stepping sequence, movable contacts 179 are shifted to the alternate position and, therefore, capacitor 185 is charged via resistor 180. When stepping switch SS3 returns to the home position, movable contacts 179 return to the position shown in FIG. 5 and, therefore, capacitor 185 discharges to energize winding 220 of the bistable relay, thereby shifting the state of the bistable relay. In this fashion the serialized output signals appearing on movable contact 200 of stepping switch SS3 are first conveyed to stepping switch SS6 to add to the total for player No. 2. On the next successive play the bistable relay has shifted positions and, therefore, the serialized output signals are conveyed to stepping switch SS5 to add to the total for player No. 1. In this fashion, the serialized output of stepping switch SS3 is added to the accumulated total of a different player on each successive play.

Stepping switches SS5 and SS6 which accumulate the units for the individual players'scores are interconnected to stepping switches SS4 and SS7, respectively, so that the tens counters advance one step when the associated units's counters have advances through their entire sequence. This is achieved by means of off-normal contacts 185 and 186. The movable contacts are coupled to ground via capacitors 230 and 231 respectively. The normally open contacts are coupled to a positive source via resistors 232 and 233 and diodes 234 and 235. The normally closed stationary contact associated with movable contact 185 is connected to energizing winding 161 of stepping relay SS4 via a diode 236, and the normally open contract associated with movable contact 186 is coupled to energizing winding 164 via a diode 237. Thus, when, for example, stepping switch SS5 moves away from the home or "zero" position, contacts 185 move to the alternate position thereby charging capacitor 231 via resistor 233. Thereafter, when stepping switch SS5 returns to the home position, off-normal contacts 185 return to the position shown in FIG. 5, thereby permitting capacitor 231 to discharge via diode 236 to energize winding 161, thereby advancing the tens stepping switch SS4 by one position. In similar fashion capacitor 230 is energized or charged when stepping switch SS6 leaves the home position, and discharges to advance stepping switch SS7 by one digit position when stepping switch SS6 passes through the home or zero position.

The players" scores are indicated on the display panel, as shown in FIG. 6, this being achieved by means of decade numeral indicators 240 and 241. The specific interconnections to the decade display indicators are not shown. However, these connections are made between the stationary contacts of contact banks C–F and are arranged so that the numerical

count displayed on the display panel corresponds to the respective positions of stepping switches SS4–SS7.

Off-normal contacts 181–184 are utilized to reset the stepping switches SS4–SS7 upon commencement if a new game. As previously noted, "coin control" relay K3 (FIG. 3) is momentarily energized when the first coin is deposited, thereby signaling the commencement of new "score" When contacts 82 of relay K3 are closed, a positive potential is applied via contacts 82 to the movable contacts of off-normal contacts 181–184. The normally open stationary contacts associated with contacts 181–184 are coupled via diodes 251–254 and interrupter contacts 171–174 to the energizing windings 161–164, respectively. Accordingly, if the stepping switches are in other than the home position, off-normal contacts 181–184 will be in the closed position, thereby energizing the energizing windings via the interrupter contacts causing the stepping switches to advance until they reach the home position. In this manner the "score" stepping switches are automatically reset when the first coin is deposited.

To summarize the score display circuits operation, it should be noted that the operation is initiated when a signal is applied via diode 165 to stepping switch SS3 which occurs at the end of the dart trajectory. Stepping switch SS3 is energized and advances through one cycle, thereby providing a series of pulses on movable contact 200 which corresponds to the player's score, as has previously been stored in the "score" relays K7–K11. This series of pulses is supplied to the appropriate one of the players' "score" stepping switches SS4 and SS5 for player one or SS6 and SS7 for player two.

When a score of 100 is reached, as indicated when either stepping switch SS4 or stepping switch SS7 is in the tenth position, a positive potential is supplied via one or the other of diodes 256 or 257 which, in turn, are connected to energizing winding 40 of "game over" relay K1 (FIG. 3). Accordingly, when the hundredth point is scored, the game over relay is energized to signify the end of the game and energize the "-game over" display 30 (FIG. 6). When relay K1 is energized it releases the holding circuit for "coin set" relay K4 which, in turn, returns to the deenergized state and opens contacts 70, so that no additional "play" signals can pass from "play" receiver 33 to "play" relay K5.

Display Control Circuits

The display unit 21 is shown in FIG. 6, along with stepping switch SS2 which controls the animation of the cartoon characters simulating the throwing of the dart, as well as the simulation of the dart trajectory toward the target 20. The display panel is generally opaque panel with various translucent area which are selectively illuminated to provide the animated displays. A compartmented structure is positioned (not shown) behind the front panel so that, by means of light bulbs or electroluminescent panels, selective areas can be illuminated in the desired sequence.

Two cartoon characters 300 and 301 are shown on the display panel which, when animated, appear to throw darts toward target 20 shown on the other side of the display panel. The area 302 forms the body portion of the cartoon character 300 whereas area 332 forms the body area of the other cartoon character 301. The areas 302 and 332 are illuminated throughout the entire game. Individual areas 303–307 show the arm of cartoon character 300 in five different positions and are associated with separate illuminating light bulbs which, in turn, are connected for energization of contacts G1–G12 on the G bank of stationary contacts of stepping switch SS2. More specifically, contacts G1, G5 and G11 are connected to the light bulb which illuminates area 305, contacts G8 and G9 are connected to illuminate the area 306, contact G8 is connected to illuminate the area 307 and contact G12 is connected to illuminate the area 303. As stepping switch SS2 advances through the first 12 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. Areas 300 through 320 are connected for energization through contacts G13–G25, respectively, so that these areas are illuminated in succession to present a display which simulates the flight of a dart toward the target area 20.

The illumination of cartoon character 301 is achieved in similar fashion. The various arm positions 333–337 are illuminated in a similar sequence through connections of the associated illuminating light bulbs to contacts H1–H12. Also, the light bulbs associated with areas 338–350 which simulate the dart trajectory from play 301 to target area 20 are illuminated in succession by means of connections to contacts H12–H15.

The display stepper SS2 includes two banks of contacts, each bank including 26 stationary contacts. The stepping switch is arranged so that upon rotation of 180°, the movable contact touches all the stationary contacts of contact bank G, whereas rotation through the next 180°, causes a different movable contact to engage the contacts in contact bank H. With this type of contact arrangement, the stepping switch automatically goes through the animation sequence for one of the cartoon characters, and then the other, without requiring any additional switching circuitry.

The stepping switch includes an energizing winding 260 which advances the stepping switch one step upon each successive energization. The interrupter contacts 262 open momentarily at the end of each advance, and the off-normal contacts 263 and 264 are in the positions shown after each 180° of rotation.

Contacts 74 of "play" relay K5 (FIG. 3) are coupled to energizing winding 260. Accordingly, each time "play" relay K5 returns to the deenergized state, capacitor 72 associated with contact 74 discharges to energize winding 260 to thereby advance stepping switch SS1 to the second position. This closes off-normal contacts 263 and, therefore, the positive potential is applied to the winding via interrupter contacts 262. Stepping switch SS2 then automatically advances through 180° or, in other words, through one complete animation sequence.

Off-normal contacts 254 of stepping relay SS2 provide the signal which actuates stepping relay SS3 to start the scoring sequence. A capacitor 270 is connected between ground and movable contact 264 whereas a resistor 271 and diode 272 connect the positive source to the associated normally open contact. The associated normally closed contact is coupled to energizing winding 160 (FIG. 5) via diode 165. Accordingly, while stepping switch SS2 is moving through its stepping sequence, movable contact 264 is in the alternate position from that shown in FIG. 6 and, therefore, capacitor 270 is being charged via resistor 271. When the stepping switch reaches the home position, movable contacts 264 return to the position shown, thereby permitting capacitor 270 to discharge via contact 274 to momentarily energize winding 160 of stepping switch SS3.

Summary of Operation

The operation commences when the appropriate coins are deposited in the remote control unit to actuate the "coin" receiver 35 (FIG 3) and to, in turn, energize "coin set" relay K4. The "coin set" relay is energized either on deposit of the first coin, or after the deposit of two coins, depending upon the position of switch 39. When the "coin set" relay is energized, and held in the energized state through its holding circuit, contacts 70 are closed, therefore coupling the contacts of "play" receiver 33 to the "play" relay K5. Under these conditions the game apparatus in activated for play. When the coin control relay K3 is momentarily energized it resets the score display circuits so that a zero score is indicated for both players on display panel 21.

When a player pushbutton switch 25 is depressed, a signal is transmitted to play receiver 33 which, in turn, energizes relay K5 and activates stepping switch SS1 for a corresponding

period of time. The stepping switch SS1 advance to a stage which depends upon the length of time during which pushbutton switch 25 is depressed. The position of stepping switch SS1 achieved in this fashion will ultimately control the position of the dart in the target areas as well as the players' score. The indication from stepping switch SS1 is subsequently transferred to score relays K7–K12. This achieved upon deenergization of "play" relay K5 when relay contacts 74 return to the normal position thereby discharging capacitor 72 via the movable contact 95 (FIG. 4) and the selected one of the stationary contacts of contact bank A to, in turn, energize the appropriate one of score relays K7–K12.

Also, upon deenergization of the K5 "play" relay, a pulse is generated via contacts 73 (FIG. 3) which is supplied to the display stepping switch SS2 (FIG. 6) and causes this stepping switch to advance through an animation sequence. Accordingly, one of the animated figures will wind up and then throw a dart which follows the simulated trajectory toward target 20.

When stepping switch SS2 reaches the end of the stepping sequence, a signal is applied to the score relays via diodes 149 or 150 (FIG. 4) to illuminate the appropriate one of the dart indications in the target area. This is achieved by means of a signal passing through the contacts 131–136 of the energized one of relays K7–K12.

Also, when stepping switch SS2 reaches the home position, a pulse is generated via contacts 264 which, in turn, activate stepping switch SS3 (FIG. 5). This stepping switch serves to provide a series of pulses corresponding in number to the score indicated by the then energized one of score relays K7–K12. The pulses are conveyed to the appropriate stepping relays SS4–SS7 (FIG. 5) for adding to that player's score, the stepping relays being selected by the BK relay which indicates the "player up."

The game continues in this fashion with the final position for each throw of the dart being determined by the player prior to the beginning of the trajectory. That is, the end point for the dart, as well as the score which the player will receive, is determined according to the length of time the player push-button is actuated prior to the simulated dart leaving animated player's hand. In this fashion an actual dart game is closely simulated.

When one set of score stepping switches S4–S7 reach a full count a signal is developed which energizes "game over" relay K1. The "game over" relay opens the holding circuit for "coin set" relay K4 which, in turn, opens contacts 70 and prevents further "play" signals from reaching the "play" relay. The final score, however, remains indicated on the display panel since the score stepping switches SS4–SS7 are not reset until a subsequent coin is deposited.

Although only one illustrative embodiment of the invention has been described in detail, it should be obvious to those skilled in the art that there are numerous variations within the scope of this invention. For example, the same or similar control circuits can be utilized in connection with horseshoe, basketball, fowl shooting, bowling, hole-in-one golf, and any other games in which an object is thrown toward a target area. With these other games it is merely necessary to modify the display panel to provide the suitable animation for the game, and, perhaps, to modify the scoring sequence. The control circuits can vary and, for example, could be constructed using solid state or integrated circuit components. The invention is more particularly defined in the appended claims.

What I claim is:

1. In an electric amusement game, the combination of

a display panel disposed for view by the players;

a player actuation means;

first circuit means coupled to said player actuation means to detect and store an indication corresponding to a player actuated time duration;

second circuit means coupled to said display panel and said player actuation means, said second circuit means being selectively operable to initiate an animation sequence on said display panel in response to termination of said player actuated time duration; and

third third circuit means connected to said first circuit means and coupled to said display panel, said third circuit means being operative to modify said animation sequence in accordance with the stored indication.

2. An electric amusement game according to claim 1 wherein said animation sequence simulates the throw of an object toward a target area on said display panel and wherein said third circuit means modifies said animation sequence by selecting the final position for said object in said target area according to the stored indication.

3. An electric amusement game according to claim 2 wherein said simulated thrown object is a simulated dart thrown toward a target.

4. An electric amusement game according to claim 1 further including a transmitter-receiver system for coupling said player actuation means to said first and second circuit means.

5. An electric amusement game according to claim 1 further including coin receiving operatively connected to couple said player actuation means to said first and second circuit means only after coins of the proper monetary value have been deposited.