

[54] **ELECTRONIC CARD GAME MACHINE**

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[51] Int. Cl. A63f 9/00, A63f 1/00

[58] Field of Search 273/1 E, 138 A, 139, 273/141 A, 142, 143; 340/378

[56] **References Cited**

UNITED STATES PATENTS

3,041,600	6/1962	Gumpertz et al.	340/378 R
3,281,149	10/1966	Miller	273/143 R
3,584,876	6/1971	Segers	273/138 A
3,658,340	4/1972	Ohki	273/143 R
3,684,290	8/1972	Wayne	273/143 C

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[57] **ABSTRACT**

A card playing machine for "poker" or the like including electronic circuitry for controlling a display of card transparencies. Initially a flashing card display is provided, the flashing time of which is selectively controlled so that either random selection or skilled selection of a card hand can be made by a player. A hand is normally obtained by the sequential operation of a plurality of manually depressed push-buttons. The control circuitry, moreover, will terminate operation and display a randomly selected hand if the player does not make his selection within a predetermined playing time. Additionally, electronic control means are also included for allowing the player to reject or "discard" one or more of the cards in the hand initially displayed and reselect or "draw" new cards in another predetermined time period in an effort to improve the card hand. Another embodiment of the invention discloses control circuitry which provides the player an option to play a game other than poker which may be, for example, "black-jack" or "twenty-one."

19 Claims, 9 Drawing Figures

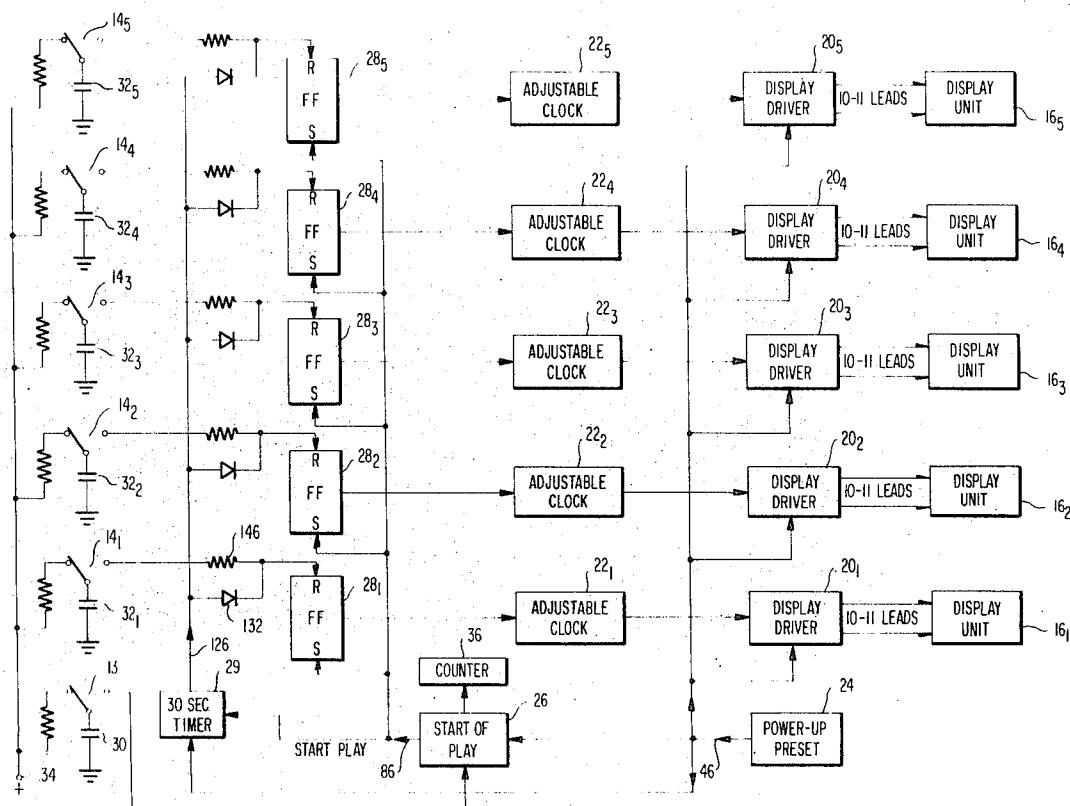


FIG 1

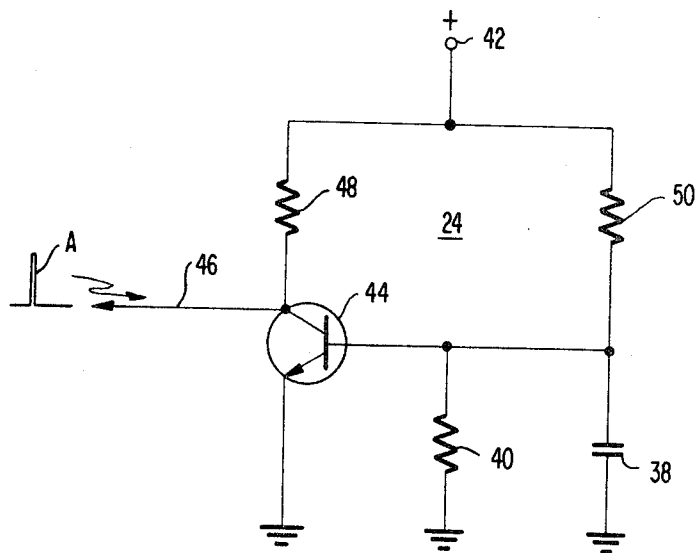
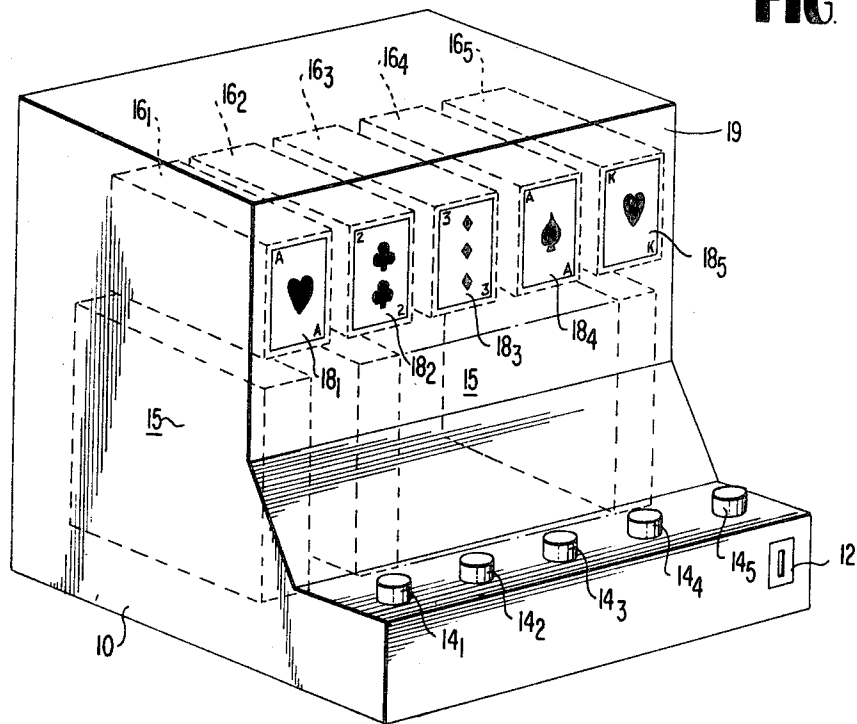


FIG 3

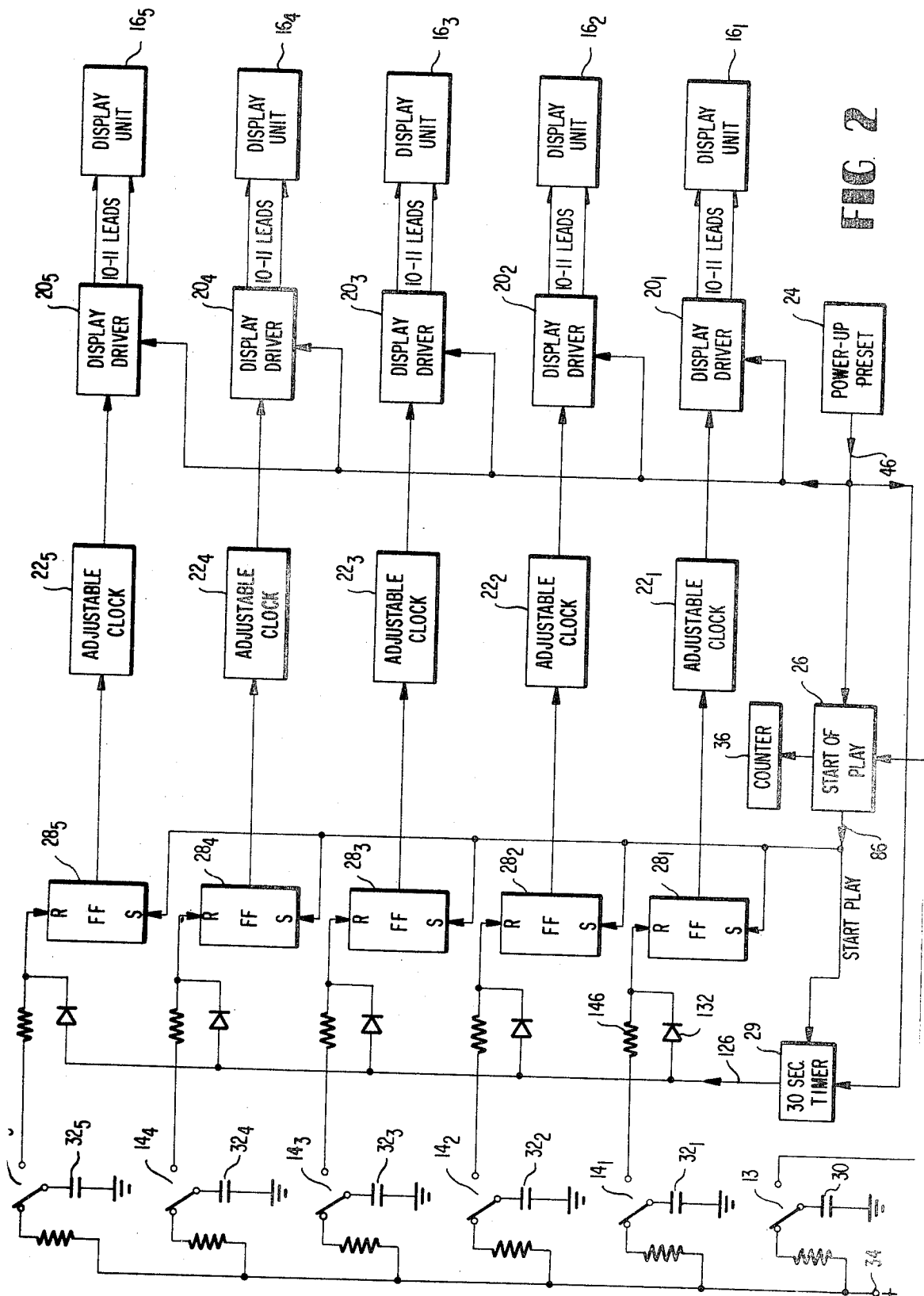
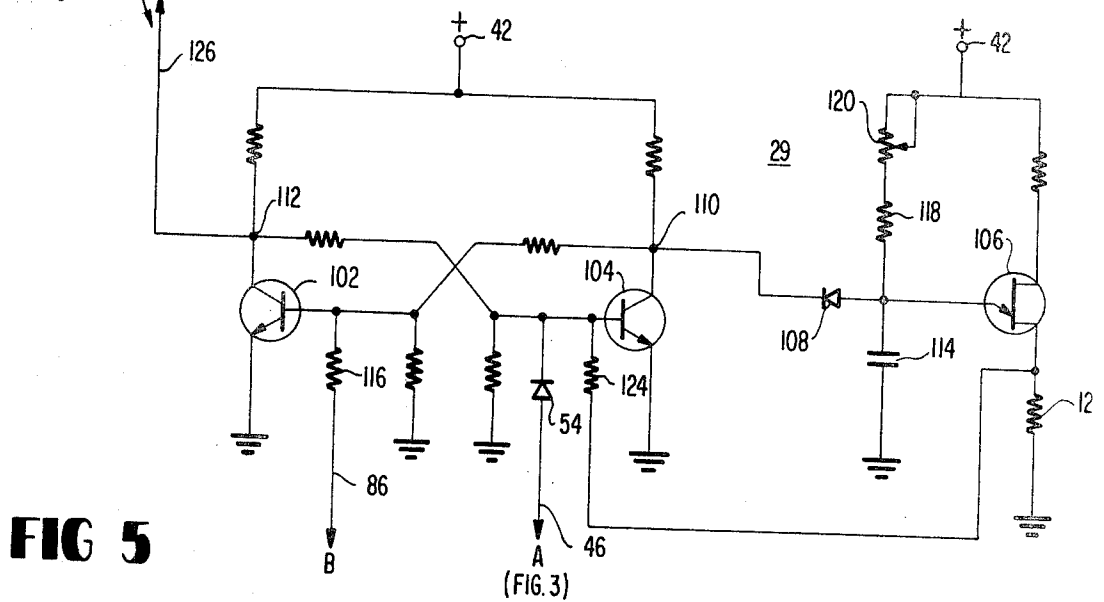
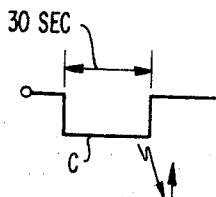


FIG. 2

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FIG. 4



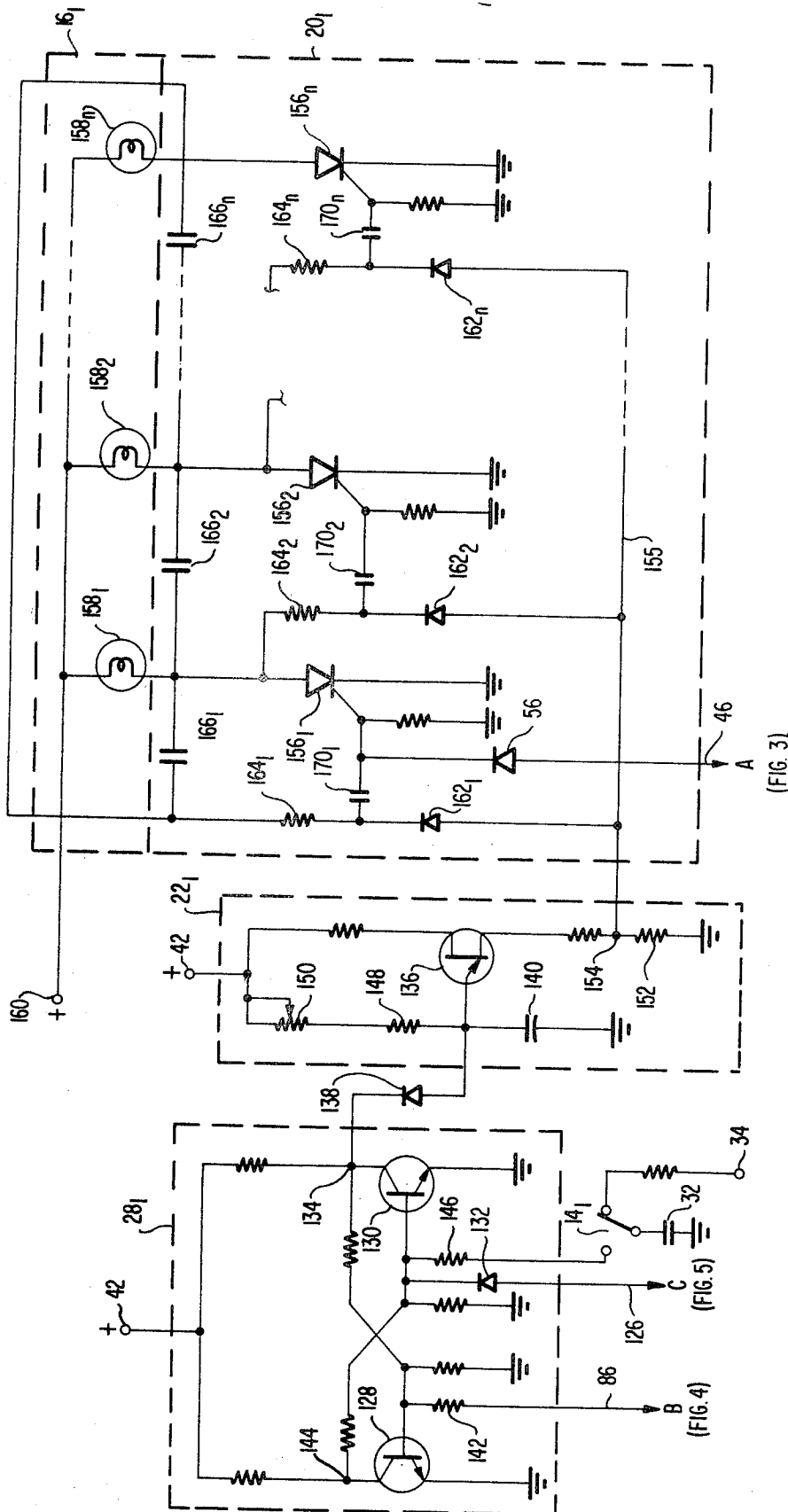


FIG. 6

FIG. 7

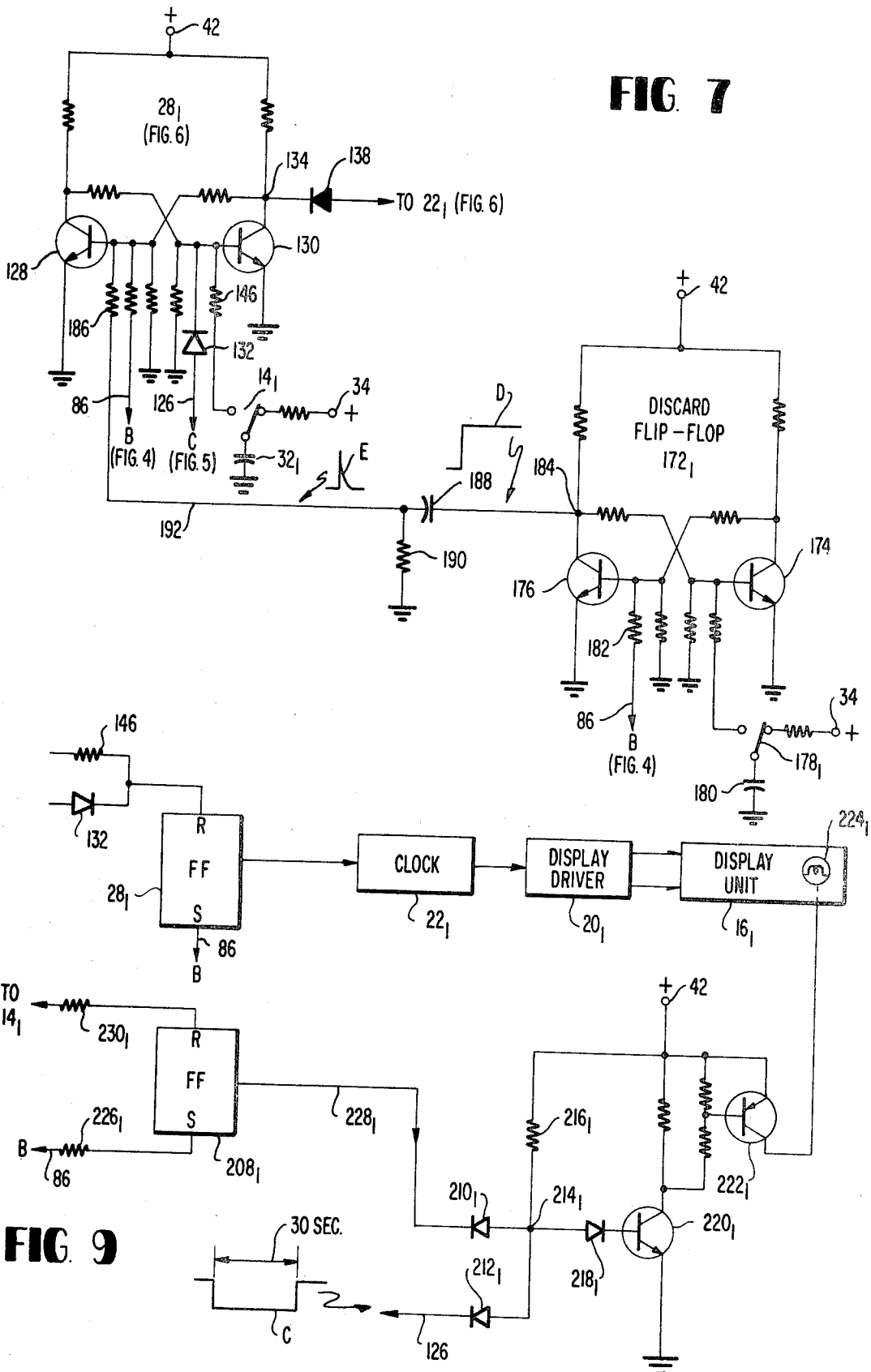
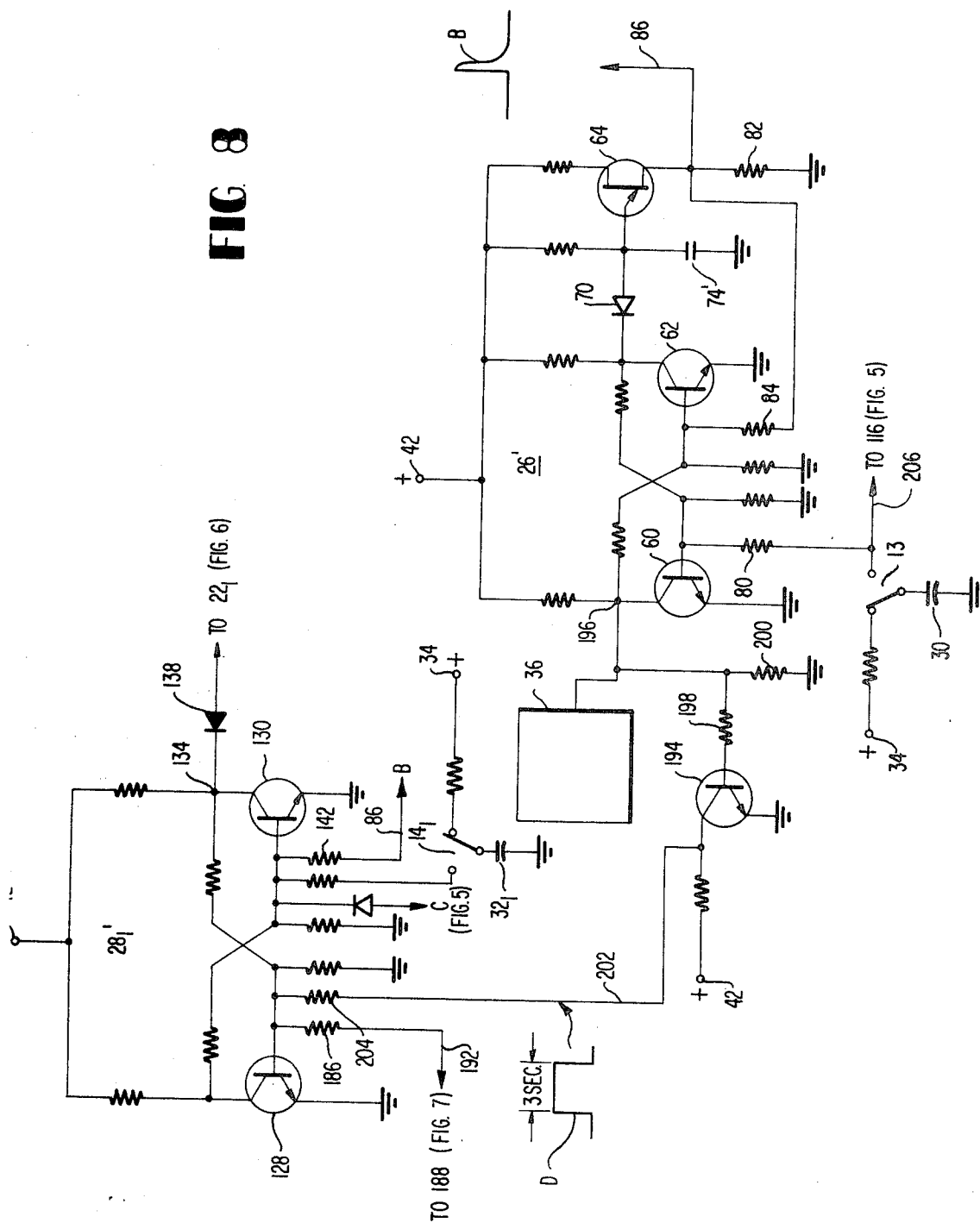


FIG. 8



ELECTRONIC CARD GAME MACHINE**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention relates to gaming apparatus and more particularly electronically controlled card playing apparatus of the type where a player selects a sequence of card transparencies which are visually displayed on the front panel of the machine.

2. Description of the Prior Art

Various prior art mechanical and electrically controlled devices have already been made which make number, letter, or character choices available with the choice either being one of a random nature or in some instances, a trained or practiced selection. Mechanical devices for playing card games such as poker are also well known to those skilled in the art and normally include for example, five reels upon which indicia of cards are displayed and winning combinations determined according to random or selective stopping of the reels by the player. Typical examples of such apparatus are disclosed in U.S. Pat. No. 3,281,149 issued to A. Miller and U.S. Pat. No. 3,606,337 issued to L.E. Larsen et al. An electronic card game device on the other hand is disclosed in U.S. Pat. No. 3,584,876 issued to Thomas E. Segers; however, this patent discloses a different type of device which operates to establish various probabilities between the relative values of two selected cards. The display panel therein contained a deck of six translucent playing cards and once a card becomes illuminated it flashes continuously on and off without any synchronization between the flashing of any two cards. Once a game is completed only one card of a predetermined color and one card of another predetermined color will remain illuminated on the display panel.

SUMMARY

Briefly, the subject invention comprises an electronically controlled card game apparatus having five projection display units each having up to twelve playing card transparencies contained therein which are selectively illuminated to provide a single projected card on its face. A respective projection lamp is associated with each of the transparencies in the units and the lamps are lighted in sequence by means of an SCR ring counter which is clocked in accordance with the output of a selectively enabled adjustable frequency unijunction clock oscillator. A control circuit, for example a flip-flop, is coupled to each of the clock oscillators for initially enabling the respective oscillator at the beginning of play whereby the card transparencies will be illuminated sequentially at the operating frequency of the oscillator. Each flip-flop circuit is further operable to inhibit the operation of the respective clock oscillator in order to provide a fixed projection of a single card transparency upon player selection or after a predetermined time limit without player selection. The former condition is provided by manual push-button means coupled to each of the flip-flops while the latter is provided by means of a timer circuit operating after a predetermined time delay (30 sec.). In order to insure initial operating state of the circuitry, first a power-up preset circuit couples a signal to the ring counters and flip-flops for effecting a predetermined operating state when power is first applied at turn-on. At the start of play another circuit again applies a set signal to the cir-

cuitry and after very short time delay (1 sec.) applies a start pulse to the flip-flops which then enable the respective clock oscillators. Such apparatus is particularly adapted for the game of poker. When desirable, additional control circuitry similar to the control circuitry referred to above, can be utilized to provide a draw poker modification and also a "black-jack" (twenty-one) modification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view generally illustrative of a structural embodiment of the subject invention;

FIG. 2 is an electrical block diagram illustrative of the basic embodiment of the subject invention;

FIG. 3 is an electrical schematic diagram of the preset circuit operable at power turn-on;

FIG. 4 is an electrical schematic diagram of the "start of play" circuitry;

FIG. 5 is an electrical schematic diagram of a play timer circuit for terminating play after a predetermined time period;

FIG. 6 is an electrical schematic diagram of one of five identical display circuits including a control flip-flop, an adjustable clock oscillator, a ring counter driver circuit, and projection type card transparency display unit;

FIG. 7 is an electrical schematic diagram of supplemental circuitry for providing a "discard" and "draw" mode of operation;

FIG. 8 is a schematic diagram illustrative of supplemental circuitry for providing a random hand and "draw" mode of operation; and

FIG. 9 is an electrical schematic diagram of the supplemental circuitry for implementing a "black-jack" mode of operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like numerals refer to like parts, attention is now directed to FIG. 1 which discloses a cabinet 10 for housing the electronic apparatus comprising the subject invention. A coin slot 12 appears on the outside thereof for the insertion of a coin by a player desiring to "play" the apparatus and acts to initiate operation at the start of play. Five push-button switches 14₁, 14₂, 14₃, 14₄ and 14₅ are selectively mounted on the front of the housing 10 such that a player can individually actuate the switches by a manual depression of push-buttons. The push-button switches 14₁ . . . 14₅ control electronic circuitry generally designated by reference numeral 15. Such circuitry is more fully disclosed in FIG. 6 and comprises a plurality of modular packages for operating five playing card display units 16₁, 16₂, 16₃, 16₄ and 16₅. The display units 16₁ . . . 16₅ are identical in construction, being of the type disclosed in U.S. Pat. No. 3,041,600, entitled "Character Projection Apparatus" issued to D. G. Gumpertz, et al.

Each display unit 16, etc. includes up to twelve individually controlled electric lamps which are adapted to light a respective card transparency which is then projected by optical means to a viewing screen 18₁. Thus by utilizing five such display units 16₁ . . . 16₅ and up to eleven lamps in each unit, all of the playing cards in a deck can be presented in groups of five on the front face 19 of the housing 10.

While FIG. 1 generally illustrates the type of gaming apparatus involved, that is a machine for playing a card game wherein the cards are transparencies selected by means of player actuated push-buttons, FIG. 2 is a system block diagram of the electronic control circuitry utilized for operating or "playing" the machine. Each of the five display units 16₁ . . . 16₅ are controlled by a respective display driver circuit 20₁, 20₂, 20₃, 20₄ and 20₅. The display drivers are all identical in circuit configuration and preferably are comprised of n-bit SCR ring counters with each bit being coupled by means of a circuit lead to a separate lamp in the display unit for illuminating a specific card transparency. Each of the display drivers 20₁, 20₂, etc. are triggered by the clock pulse output from a respective controlled clock oscillator.

More particularly, each of the display drivers 20₁, 20₂, 20₃, 20₄ and 20₅ respectively receive clock pulses from adjustable clock oscillators 22₁, 22₂, 22₃, 22₄ and 22₅. The display drivers 20₁ . . . 20₅ additionally receive a signal from a power-up pre-set circuit 24 whereby a selected bit of the ring counter is triggered "on" at the time that power is first applied. The power-up pre-set circuit is also coupled to a "start of play" circuit 26 which has for its purpose initially setting the output state of five flip-flop circuits 28₁, 28₂, 28₃, 28₄ and 28₅ which respectively operate to enable or inhibit operation of the adjustable clock oscillators 22₁, 22₂ . . . 22₅. In FIG. 2, the start of play switch 13 and push-button switches 14₁ . . . 14₅ are shown in their respective normally deactivated position. The normally closed contacts of these switches are adapted to charge respective capacitors 30 and 32₁ . . . 32₅ to a positive potential applied to power supply terminal 34. At the start of play, the switch 13 is activated and the normally open contacts become closed whereupon capacitor 30 applies a positive potential to the "start of play" circuitry 26. In the same manner, the push-button switches 14₁ . . . 14₅ when manually activated couple the respective capacitors 32₁ . . . 32₅ to the reset terminal of the flip-flop circuits 28₁ . . . 28₅ which act to inhibit further operation of the respective clock oscillator 22₁ . . . 22₅.

Prior to discussing the circuit details, a brief description of the operation of the basic embodiment shown in FIG. 2 will be presented. When the machine is turned "on" and power is first applied, the display drivers 20₁ . . . 20₅ are set as indicated above. At the start of play an operator activates the switch 13 by inserting a coin in the coin slot 12 (FIG. 1). Thereafter he disables the clock oscillators 22₁ . . . 22₅ by selectively pressing the respective push-button switches 14₁, 14₂ . . . 14₅. He has a predetermined time limit (30 seconds) during which he must energize push-button switches 14₁ . . . 14₅ before the machine automatically stops play. Also the "start of play" circuit 26 is set in order to, inter alia, trigger a counter or tally means 36, when the start switch 13 is actuated. When switch 13 is activated the circuit 26 after a short time delay of example 1 sec. triggers the timer circuit 29 as well as the five flip-flop circuits 28₁ . . . 28₅. The flip-flop circuits all switch a first output state which enable the respective clock oscillators 22₁ . . . 22₅ which then apply clock pulses to the respective display drivers 20₁ . . . 22₅. The adjustability of the clock oscillators 22₁ . . . is significant in that it is desirable in one mode of operation to make the clock frequency slow enough (4-10 pps) so that a player can distinguish the various card faces ap-

pearing on the respective display screens 18₁ . . . 18₅ (FIG. 1). The player selectively depresses push-buttons 14₁ . . . 14₅ which will cause its respective flip-flop to switch to a second or opposite output state which then act to deactivate the respective clock oscillators. The display units will then respectively display a fixed card transparency on the front panel 19. If the player fails to make the desired choices such as five choices for the game of poker in the allotted time limit, the push-button switches 14₁ . . . 14₅ are disabled by the timer circuit 29, resetting the five flip-flop circuits 28₁ . . . 28₅. Thus, a selection of a five card display is made for the player. The normal rules of poker can then be used to determine the winner. While the adjustable clock oscillators 22₁ . . . 22₅ were noted to be preferably slow enough in frequency so that a player can visually distinguish card faces, the clock frequencies when desirable can be increased requiring a greater degree of operator skill and may also be increased to the point wherein a completely random selection is made by the operator.

Turning now to a more detailed description of the electronic circuit configurations embodying the subject invention, attention is first directed to FIGS. 3-6, inclusive, which schematically represent the block diagrammatic representation shown in FIG. 2. FIG. 3 illustrates the preferred embodiment of the power-up preset circuit 24 which is operable only for a short period of time when power is first applied thereafter becoming inoperative. Referring now to FIG. 3, capacitor 38 is initially discharged having been previously discharged through resistor 40. Upon the application of a positive supply potential to terminal 42 from a power supply, not shown, transistor 44 being an N-P-N transistor, will be initially non-conductive or in an "off" state. The collector of transistor 44 will then be "high," that is, at the positive power supply potential as opposed to "low" which is near ground reference potential when transistor 44 is "on." Therefore, a signal corresponding to waveform A appears on circuit lead 46 and will initially be high because of the load resistor 48 being connected from the collector of transistor 44 to the power supply terminal 42. This positive voltage appearing on circuit lead 46 is simultaneously applied to the start of play circuit 26 shown in FIG. 4, the thirty second timer circuit 29 shown in FIG. 5, and the display driver circuits 20₁ . . . 20₅ one of which is shown in FIG. 6, it being understood that all of the display driver circuits 20₁ . . . 20₅ are identical in configuration. Approximately 300 milliseconds after power is applied which time is determined by the RC time constant of capacitor 38 and resistor 50, capacitor 38 charges through resistor 50 to a level whereupon the base of transistor 44 becomes sufficiently positive to saturate transistor 44 which then acts like a closed switch. The voltage at the collector of transistor 44 and consequently on circuit lead 46 drops to approximately 0.3 volts above ground which is the voltage drop across the saturated transistor 44.

Diodes 52, 54 and 56 shown in FIGS. 4, 5 and 6 respectively are coupled to circuit lead 46 from the collector of transistor 44 and are so poled that when transistor 44 saturates and its collector goes low, the diodes effectively disconnect transistor 44 from the circuit 26, the timer circuit 29 and the display driver 20. These diodes, moreover, will continue to block the respective circuits from the transistor 44 as long as power is applied to the machine. Therefore, circuit lead 46 provides a signal which goes high immediately upon the

application of power, but after a time delay in the order of 300 milliseconds, goes low and thereafter remains low.

Referring now to FIG. 4 which discloses the "start of play" circuitry, circuit 26 interfaces with the start switch 13 associated with the coin drop 12 shown in FIG. 1 and a counter circuit 36. The circuit 26 comprises a one shot delay pulse generator made up of a flip-flop circuit including transistors 60 and 62, a driven pulse oscillator including unijunction transistor 64 and a coupling diode 66. The momentary initial signal (waveform A) appearing on circuit lead 46 when power is turned on causes a positive signal to be applied to the base of transistor 62 which turns "on." Circuit junction 68 immediately goes low while the opposite transistor 60 turns "off" causing the voltage at junction 70 to go high. This is the initial power-up preset state of the flip-flop. The diode 66 is coupled from circuit junction 68 to circuit junction 72 which is common to the emitter of the unijunction transistor 64 as well as capacitor 74 and resistor 76. Moreover, resistor 76 is coupled to the positive supply potential applied to terminal 42. The conductive state of transistor 62 causes capacitor 74 to discharge through diode 66 and remain in a discharged condition thereby effectively grounding the emitter of unijunction transistor 64, causing it to be non-conductive.

As noted earlier, in its normally closed position, as shown in FIG. 4, the start switch 13 charges capacitor 30 to a positive potential through resistor 78. When the switch 13 is activated to initiate operation, the positively charged capacitor 30 is coupled to the base of transistor 60 through resistor 80. Transistor 60 immediately turns "on" and due to the resistive coupling, transistor 62 immediately turns "off." The voltage at circuit junction 68 immediately goes high which causes diode 70 to become non-conductive, whereupon capacitor 74 begins to charge toward the positive supply potential through resistor 76. After an RC time delay of approximately 1.0 sec., capacitor 74 charges to a level sufficient to cause the unijunction transistor to "fire," i.e. become conductive. Capacitor 74 immediately discharges through the emitter and one base 75 of unijunction transistor 64 causing a voltage pulse corresponding to waveform B to appear across resistor 82. This pulse (waveform B) is fed back to the base of transistor 62 by means of resistor 84 which immediately resets the flip-flop by turning transistor 62 back "on," completing a one shot cycle. This pulse (waveform B) is also simultaneously coupled to all of the flip-flops 28₁ . . . 28_n (FIG. 2) by means of circuit lead 86 and also to the play limit timer circuit 29 shown in FIG. 5.

Also when transistor 60 is turned "on," transistor 88 which has its base connected to the collector of transistor 66, turns "off," allowing the positive voltage through resistors 90 and 92 to turn transistor 94 "on" which is part of the counter circuit 36. The conduction of transistor 94 energizes an inductance 98 which is part of a tally or counter mechanism, not shown. Inductance 98 remains energized until the flip-flop is reset after the 1 sec. time delay as noted. A diode 100 is connected across the inductance 98 to allow the inductor to discharge when transistor 94 again becomes non-conductive. Thus the circuit 26 triggers the tally counter circuit 26 and produces the pulse (waveform B) 1 sec. after initiation of play.

Referring now to FIG. 5, the timer circuit 29 measures a 30 sec. time period to limit the active time of the machine requiring a player to make all his selections within the specified time. More particularly, the timer circuit 29 comprises a one-shot signal generator made up of a flip-flop circuit including transistors 102 and 104 and a driven unijunction oscillator including unijunction transistor 106 coupled to the flip-flop by diode 108. The power-up preset pulse (waveform A) is coupled to the base of transistor 104 through the diode 54 which initially makes transistor 104 conductive, thereby making the voltage at circuit junction 110 low. The other transistor 102 in the flip-flop circuit is non-conductive, and therefore the voltage at circuit junction 112 is high. The emitter of unijunction transistor 106 is coupled to circuit junction 110 by means of the diode 108. Since transistor 104 is conductive, the diode 108 shunts capacitor 114, thereby discharging it and holding unijunction transistor 106 non-conductive. Upon the generation of the pulse (waveform B) at the base of unijunction transistor 64 in the start of play circuitry 26 shown in FIG. 4, it is applied by means of resistor 116 to the base of transistor 102 which is driven conductive. The voltage at the collector of transistor 102 immediately goes low as evidenced by the waveform C. The flip-flop action causes transistor 104 to turn "off" whereupon the blocking action of the diode 108 allows capacitor 114 to charge through the fixed resistor 118 and the variable resistor 120. After an RC time delay of approximately 30 sec., the voltage across capacitor 114 causes the unijunction transistor 106 to "fire" causing a trigger pulse to be generated across resistor 122. The pulse appearing across resistor 122 is coupled back to the base of transistor 104 by means of resistor 124 which gain turns transistor 104 "on." Transistor 102 again becomes non-conductive and the voltage at the collector and circuit junction 112 again goes high. This voltage which appears as waveform C is coupled to the flip-flops 28₁ . . . 28_n (FIG. 2) by means of circuit lead 126. The output level of the voltage appearing on circuit lead 126 is adapted to simultaneously reset any of the flip-flops 28₁ . . . 28_n that have not already been reset by a player actuating push-button switches 14₁ . . . 14_n.

Referring now to FIG. 6, there is disclosed one of five identical circuit sections each including for example display unit 16, its respective driver circuit 20, the adjustable clock oscillator 22 for the driver circuit, and the control flip-flop 28 which enables and inhibits the operation of the clock oscillator 22. More particularly, the flip-flop 28₁ is comprised of transistors 128 and 130. At power turn-on, the voltage on circuit lead 126 is high as evidenced by waveform C. This signal is applied through the diode 132 to the base of transistor 130, causing it to become conductive, thereby making the voltage at circuit junction 134 low. Junction 134 is coupled to the emitter of unijunction transistor 136 by means of the diode 138. As long as transistor 130 in the flip-flop circuit 28₁ is conductive, the regenerative action of the circuit 22₁ will be inhibited due to the fact that capacitor 140 is shunted by means of the conductive diode 138 and the conductive transistor 130. Thus, initially the oscillator 21₁ is inoperative. Upon the closing of the play switch 13 wherein the pulse (waveform B) is generated, this signal is coupled by means of circuit lead 86 and resistor 142 to the base of transistor 128 which causes the flip-flop to change state, that is

the voltage at circuit junction 144 goes low while circuit junction 134 goes high. The voltage appearing on circuit lead 126, meanwhile, has gone low, being blocked by the action of diode 132. The high state of circuit junction 134 will remain until push-button switch 14, is player actuated whereupon a positive voltage accumulated on capacitor 32 is coupled to the base of transistor 130 or the voltage on circuit lead 126 again goes high after a 30 sec. interval.

During the time at which circuit junction 134 is high, the diode 138 decouples capacitor 140 from the flip-flop 28₁. The oscillator 22₁ will become enabled and capacitor 140 charges by means of the fixed resistor 148 and the variable resistor 150. The capacitor 140 charges to the breakdown level of the unijunction transistor 136 whereupon capacitor 140 immediately discharges through the unijunction transistor 136 which turns "off," whereupon the capacitor 140 again charges. A positive pulse train will appear across resistor 152. The oscillator 22₁ will free run at a frequency determined by RC time constant of the capacitor 140 and the resistors 148 and 150. Thus the flip-flop circuit 28₁ and the unijunction clock oscillator 22₁ operate as previously described, with the exception that the output pulse developed across resistor 152 and appearing at circuit junction 154 is not fed back to the flip-flop but is fed to the display driver circuit 20₁ via circuit lead 155.

The driver circuit 20₁ comprises a semiconductor controlled rectifier (SCR) ring counter of *n*-bits. The ring counter includes a plurality of SCRs 156₁, 156₂, . . . 156_{*n*}, which are equal in number to the number of lamps 158₁, 158₂, . . . 158_{*n*}, required to be sequentially lit in the display unit 16₁. In the subject embodiment, *n* is preferably equal to 11, so that five display units can be adapted to project 5 × 11 different characters which is sufficient to display a deck of card transparencies as five card playing "hands." Taking one stage of the ring counter, for example the first stage, the lamp 158₁ is connected in series between a source of positive power supply potential applied to terminal 160 and the anode electrode of SCR 156₁. The cathode of the SCR is directly connected to ground. Upon the application of a positive pulse to its gate electrode, SCR 156₁ will become conductive to light the lamp 158₁ and will remain conductive until it is turned "off" in a manner to be described. As previously indicated, the power-up preset circuit 24 as shown in FIG. 3, is coupled to the gate of SCR 156₁ by means of circuit lead 46 and the diode 56. Thus when power is first applied, a positive pulse is coupled to the gate of SCR 156₁ which turns it "on." Likewise, the identical corresponding SCR and lamp in the other four display drivers circuits and display units, respectively, are also energized.

Returning to the circuitry shown in FIG. 6, all of the other lamps 158₂, . . . 158_{*n*}, are "off" due to the non-conductivity of the respective SCRs 156₂, . . . 156_{*n*}. With SCR 156₁ being conductive, the anode is substantially at ground potential. The cathode of diode 162₂, which is coupled to the anode of SCR 156₁ by means of resistor 164₂ is accordingly also near ground potential while all other diodes 162₁, . . . 162_{*n*}, have their cathodes near the positive potential applied to terminal 160, that is, they are reverse biased. Additionally, capacitor 166₂ is charged to the supply potential appearing at terminal 160 through the conductive SCR 156₁. When the first clock pulse generated by unijunction

clock oscillator 22₁ appears on the common circuit lead 155, diode 162₂ is the only diode not reverse biased. The clock pulse is therefore coupled through capacitor 170₂ which turns SCR 156₂ "on." SCR 156₂ becomes conductive very rapidly, lighting the lamp 158₂. The now conductive SCR 156₂ and the previously conductive SCR 156₁ provide a discharge path for the previously charged capacitor 166₂. In discharging, capacitor 166₂ effects a reverse current flow through SCR 156₁ which now turns "off," leaving only SCR 156₂ "on." Each succeeding clock pulse will fire the succeeding SCR due to the free running capability of the unijunction oscillator 22₁ until such time that the player pushes a respective push-button 14₁ or the 30 sec. timer circuit output (waveform C) on circuit lead 126 again goes high, at which time the flip-flop circuit 28₁ is reset, thereby making the voltage at circuit junction low. As indicated, when circuit junction 134 goes low, the coupling diode 138 inhibits or disables the operation of the charging and discharging of the capacitor 140 so that one of the lamps 158₁, . . . 158_{*n*}, will remain lit to project a card transparency on its display screen 18₁.

Recapitulating the operating cycle for the apparatus thus described, play begins with the switch 13 changing state thereby setting the flip-flop comprised of transistors 60 and 62 (FIG. 4) in the start of play circuitry 26. The tally counter 36 is energized and after a one second delay, the unijunction transistor 64 shown in FIG. 4, conducts and pulse waveform B is generated which then resets the above mentioned flip-flop. Additionally, the pulse (waveform B) sets the flip-flop circuit comprised of transistors 102 and 104 of the 30 sec. timer circuit 29 (FIG. 5) and the five flip-flops 28₁, 28₂, 28₃, 28₄ and 28₅ (FIGS. 2 and 6). At this time five character displays 16₁, 16₂, 16₃, 16₄ and 16₅ sequentially present card faces in sets of five, changing at a rate determined by the frequency of the respective unijunction clock oscillators 22₁, 22₂, etc. The player now has 30 sec. to make his selections of five card projections by selectively depressing push-button switches 14₁, 14₂, 14₃, 14₄ and 14₅ in any desired order. However, if the player does not make all five selections within the predetermined time limit the timer circuit 29 produces an output signal corresponding to waveform C which resets any display control flip-flop 28₁, . . . 28₅, not yet manually reset by player operation.

Having thus described the basic embodiment of the subject invention, it becomes desirable to now disclose modifications of the circuitry described in order to provide a different mode of play or operation.

Whereas it becomes desirable in another form of poker to initially be "dealt" a five card hand and thereafter "discard" and "draw" new cards in order to improve the hand, it merely becomes necessary in the present invention to include another flip-flop circuit operable with each of the five flip-flop circuits 28₁, . . . 28₅ and five additional push-button switches for respectively controlling the additional five flip-flop circuits. To this end, attention is now directed to FIG. 7 which discloses one of the five additional flip-flops and push-buttons required to operate one display unit in order to provide a discard and draw capability. FIG. 7 discloses a "discard" flip-flop circuit 172₁ comprised of transistors 174 and 176. Additionally, a respective push-button switch 178₁ shown in its normally deactivated position, is coupled between a positive source of

voltage potential applied to terminal 34 and a capacitor 180. The base of transistor 176 is coupled to circuit lead 86 by means of resistor 182 for receiving the pulse (waveform B) generated by the start of play circuit 26 shown in FIG. 4. The collector of transistor 176 at circuit junction 184 is coupled to the base of transistor 128 of the display control flip-flop circuit 28, by means of a resistor 186 and a differentiator circuit comprised of capacitor 188 and resistor 190.

In operation, the game starts as previously described. Now after the player has selected five cards by depressing the push-buttons 14₁ . . . 14₅ or after the predetermined time limit (30 sec.), he may now choose to discard any or all cards and redraw to his "hand" displayed on the front panel 19 of the machine (FIG. 1). This is accomplished by the extra set of five flip-flop circuits 172₁ (FIG. 7) and 172₂ . . . 172₅ (not shown) and push-buttons 178₁ (FIG. 7) and 178₂ . . . 178₅ (not shown). The "discard" flip-flop 172₁ is initially set by the pulse (waveform B) 1 sec. after the beginning of play, the same as previously described with respect to flip-flops 28₁, etc. If during the 30 sec. allowed time interval he chooses to discard a card he has been "dealt," for example the transparency displayed by the unit 16₁, it is merely necessary to push the push-button 178₁, which couples the charged capacitor 189₁ to the base of transistor 174 which immediately turns "on." Transistor 176 turns "off" and the voltage at circuit junction 184 goes high, as depicted by waveform D. The differentiator circuit comprising capacitor 188 and resistor 190 generates a positive going trigger waveform E which is coupled to the base of transistor 128, turning it "on." Transistor 130 turns "off" and the voltage at circuit junction 134 goes high, allowing the unijunction clock oscillator 22₁ to again become enabled, as it did when the game initially started. The player can now select a new card simply by again depressing push-button 14₁. Further actuation of the additional push-button switch 178₁ will have no effect because the discard flip-flop circuit 172₁ has been set and cannot be reset until a new game begins.

The foregoing configurations have allowed a player to manually select a poker hand by energizing the push-button switches 14₁ . . . 14₅. The circuit configuration shown in FIG. 8 now discloses a modification of the circuitry whereby a player is supplied a random hand immediately without any manual selection, but thereafter providing a "discard" and "draw" option to improve the hand thus supplied. Considering now FIG. 8, reference numeral 26' denotes a modification of the start of play circuitry shown in FIG. 2 to a 3 sec. delay configuration as opposed to the 1 sec. delay previously used by varying the capacitance value of the capacitor 74'. Additionally, another transistor 194 is coupled to the collector of transistor 60 at junction 196 by means of resistors 198 and 200. The collector of transistor 194 is coupled by means of circuit lead 202 and resistor 204 to the base of transistor 128 of the display control flip-flop 28₁, and like corresponding points of modified flip-flop circuits 28₂' . . . 28₅' (not shown). Whereas circuit lead 86 couples the pulse (waveform B) to the flip-flop 28₁ in the previous configuration such as shown in FIG. 6, in the instant embodiment the circuit lead 86 and resistor 142 is now coupled to the base of transistor 130. Also, in the embodiment shown in FIG. 8, a circuit lead 206 is coupled to resistor 116 in FIG. 5 instead of the lead 86 as shown in FIG. 5. Furthermore, by varying

the value of resistor 130 of the timer circuitry 29 shown in FIG. 5, the pulsewidth of the waveform C is increased such that it is, for example 33 sec.

Now when switch 13 is energized by dropping a coin in the slot 12, (FIG. 1) the transistor 60 in the flip-flop associated with the 3 sec. delay pulse generator circuitry 26', is turned "on." This turns transistor 62 "off" whereupon after a 3 sec. time delay unijunction transistor 64 fires generating the pulse (waveform B). Meanwhile, the flip-flop circuit associated with the timer circuit 29 shown in FIG. 5, has been set by means of the connection of circuit lead 206 to begin generation of waveform C. The turning "on" of transistor 60 by the closing of the switch 13, moreover, causes the voltage at junction 196 to go low, which turns transistor 194 "off." In turning "off," the collector of transistor 194 goes high, as shown by waveform D and is coupled by means of circuit lead 202 and resistor 204 to the base of transistor 128 of the modified display control flip-flops 28₁', etc. Waveform D turns transistor 128 "on" and transistor 130 "off." This action allows the free running clock oscillators 22₁ . . . 22₅ to again become enabled. Due to the fact that the voltage waveform D is high for a period of 3 sec., it will override the player push-button 14₁ during the 3 sec. it is high. During this time the SCR ring counters 20₁ . . . 20₅ continually vary the presentation of the respective display units 16₁ . . . 16₅. At the end of the 3 sec. period, pulse (waveform B) is now applied to the base of transistor 130, which turns it "on" and has the effect of deactivating the respective clock oscillator 22₁, etc. Also at this time waveform D again goes low. The player now has a randomly selected hand of five cards chosen by action of the machine itself. The control flip-flop 28₁' is also coupled to the discard flip-flop circuitry 172₁, shown in FIG. 7 so that the player has the further option of discarding one or more cards selected by the machine and drawing new cards by subsequent manual operation of the push-button switches 14₁ . . . 14₅ during the remaining 30 sec. interval after the hand has been displayed 3 sec. after start of play.

The apparatus as heretofore described, has for its purpose primarily the playing of a five card hand required for playing the game of poker. While not immediately recognizable, the circuitry heretofore described with respect to the subject invention, can also be modified to operate so as to allow the operator to play the game of "black-jack" or "twenty one." Such a game would be played wherein the "dealer," i.e., the machine is assumed to have 18 points at all times. It is well known that in order to win at black-jack, it is necessary to beat the dealer by having a point count greater than that of the dealer, but in any event equal to or less than twenty-one. The player can also win if he "hits" and receives five cards which total 21 or less. Also, in this type of game, an ace counts as either one or eleven points, at the player's option.

In order to play black-jack, the electrical circuitry described with respect to FIGS. 2 through 6 would remain the same and the cards are selected in the same manner as previously described, that is by push-button. However, now a player inserts a coin and the machine runs as in the random-hand draw poker mode for several seconds after which the last two or right-hand display units 16₄ and 16₅ are stopped, thereby presenting the player with a two card dealt hand. This is accomplished by the circuit means described in FIG. 8 with

the exception that only the last two units 16₄ and 16₅ of the five display units stop after the 3 second interval and thereafter the player, if he desires a "hit," now is dealt one or more additional cards by selective actuation of pushbuttons 14₁, 14₂, and 14₃. At the end of the predetermined time limit of play, e.g. 30 sec., the player may or may not have selected additional cards by means of manual actuation of pushbuttons 14₁, 14₂ or 14₃ (FIG. 2) in attempting to beat eighteen points, but not exceed twenty-one points. However, after the 30 sec. playing time interval, the remainder of the displays stop as a result of the timer circuit 29. The only difference in circuitry required from the poker game configuration previously described in the provision of a visual indication of which cards the player has selected and which cards are unselected at the end of the 30 sec. time limit. This is easily accomplished by the apparatus thus described because each display unit 16₁, . . . 16₅ includes 12 display lamps; however, only 11 lamps in each unit are required for displaying transparencies of a deck of playing cards. If the twelfth display lamp of display units 16₁ . . . 16₅ is suitably lighted at the end of the playing time period in the event that the respective push-button switch 14₁, 14₂ or 14₃ has not been activated by the player, the twelfth lamp can project, the example, a transparency of an X on the screen to indicate that it was not chosen by the player.

Apparatus for providing such a modification is shown by the circuitry displayed in FIG. 9. Again, only one of the first three identical circuit sections for display unit 16₁, 16₂ and 16₃ are shown. The additional circuitry required includes, inter alia, flip-flop 208₁ coupled to diode 210₁. A diode 212₁ is coupled for circuit lead 126 to circuit junction 214₁ and carries waveform C from the timing circuitry 29 shown in FIG. 2. A resistor 216₁ is coupled from the positive supply terminal 42 to the anode electrodes of diodes 210₁, 91 and 212₁. Circuit junction 214₁ couples another diode 218₁ to the base of transistor 220₁. The collector of transistor 220₁ is connected to the base of a second transistor 222₁ of opposite conductivity and the two transistors 220₁ and 222₁ operate in a complementary transistor configuration from the positive supply source connected to terminal 42. The collector of transistor 222₁ is connected to the 12th lamp 224₁ in the display unit 16₁. Diodes 210₁ and 212₁ in combination with the resistor 216₁ form a coincidence or AND logic gate that requires two high signals to appear at their cathode electrodes simultaneously in order to provide a high signal at junction 214₁ which is also common to the anode of diode 218₁. This condition exists at the collector of transistor 130 of flip-flop 28₁ (FIG. 6) when play begins due to transistor 128 being triggered on by the pulse (waveform B). In the present embodiment, waveform B is coupled to the set S input of flip-flop 208₁ by means of resistor 226₁ which sets the flip-flop output appearing on circuit 228₁ to a high state. This supplies the AND gate with one high input. The other input of the AND gate is waveform C which is low during the 30 sec. time of play interval only. If during play the player does not depress pushbutton switch 14₁ which coupled to the reset R input of the flip-flop 208₁ by means of resistor 230₁, the flip-flop is not reset so that at the end of 30 seconds the AND gate including diodes 210₁ and 212₁ has two high inputs, which turn "on" transistors 220₁ and 222₁ and the light lamp 224₁.

To further describe the circuit operation, assume that play begins and waveform C from the timer circuit 29 goes low for a 30 sec. period. The cathode of diode 212₁ meanwhile, is at ground and its anode will be at .7 volts, which is an insufficient voltage to drive transistor 220₁ into conduction through diode 218₁. When transistor 220₁ is non-conductive, so will be transistor 222₁ and the lamp 224₁ will remain deenergized. If after thirty seconds pass the player does not energize the push-button 14₁, the cathode of diode 212₁ again goes high. Since flip-flop 208₁ was never reset, the cathode of diode 210₁ remains high and thus provides the logic condition under which the lamp 224₁ will light. With both diodes high, the anode of diode 218₁ goes high and current through resistor 216₁ turns transistor 220₁ on. Transistor 220₁ will saturate, causing transistor 222₁ to turn on and thereafter energize the light 224₁.

While there has been shown and described what is at present considered to be the preferred embodiments of an improved electronically controlled gaming apparatus, modifications thereto will readily occur to those skilled in the art. It is not desired, therefore, that the invention be limited to the specific circuit configurations shown and described, but it is to be understood that all equivalents, alterations and modifications falling within the spirit and scope of the present invention are herein meant to be included.

I claim as my invention:

1. An electronically controlled game apparatus particularly adapted to play card games such as poker, black-jack and the like, comprising in combination:

a plurality of electrically controlled character projection display units, each including a selected number of individual character bearing means adapted to be illuminated by respective electric lamp means which when energized projects a character such as a card face on a display screen located on one face of said display unit;

a housing wherein each of said plurality of display units are mounted such that said plurality of display screens are adapted to be viewed as a group;

an electronic display driver circuit coupled to each of said plurality of display units, said driver circuit being operable to energize said electric lamps one at a time in said display unit to provide both a flashing display of a sequence of different characters as well as a steady state display of a single character; an electronic clock oscillator coupled to each display driver circuit, said oscillator being selectively rendered operative and inoperative in accordance with the output state of a respective control circuit to generate a pulse output, said driver circuit being responsive to the pulse output of said clock oscillator to control the energization of said electric lamps in the respective display unit;

an electronic binary control circuit coupled to each clock oscillator, being operable to have a first and second output state and including input means responsive to a first and second type input signal to switch to said first and second output state respectively and including output means coupled to said clock oscillator wherein said clock oscillator becomes operative when said control circuit switches to said first output state and thereby generate a pulse train, said input means being further responsive to at least one additional second type input sig-

nal whereby said control circuit switches to said second output state to render said clock oscillator inoperative;

first circuit means, including starting means, coupled to said input means of each said control circuits for generating and coupling said first type input signal thereto when said starting means is activated by a player; and

second circuit means coupled to said input means of said control circuit generating and coupling said second type input signal to said control circuit for terminating operation of said game apparatus.

2. The apparatus as defined by claim 1 wherein said second circuit means includes player operated switch means and a signal source coupled to said switch means, said switch means upon actuation by said player operates to couple said signal source to said input means of said control circuit, whereupon said control circuit switches to said second output state.

3. The apparatus as defined by claim 1 wherein said second circuit means comprises player operated means coupled to each control circuit for individually switching said control circuits to said second output state deliberately and instantaneously, and a timer circuit coupled to all of said control circuits for switching said binary control circuits to said second output state after a predetermined period of time without the operation of said player operated means.

4. The apparatus as defined by claim 3 wherein said control circuit comprises a flip-flop circuit.

5. The invention as defined by claim 3 wherein said timer circuit is comprised of a time delay pulse generator triggered into operation by said first circuit means.

6. The invention as defined by claim 3 wherein said player operated means comprises manually actuated electrical switch means.

7. The apparatus as defined by claim 3 and additionally including:

at least one AND logic gate having first and second input means and output means;

at least one respective lamp energization circuit means coupled between said output means of said AND gate and a selected display unit of said plurality of display units for operating another lamp in said selected display unit;

at least one other electronic control circuit having an output coupled to said first input means of said AND logic gate and being operable to produce a first and a second output state at said output and including input means responsive to said first and second type input signal to switch to said first and second output state respectively;

said AND logic gate having said second input means coupled to said timer circuit, said AND gate being responsive to the voltage output level of said timer circuit after said predetermined time period and said first output state of said one other electronic control after said predetermined time period to energize said another lamp and thereby provide an indication that the respective player operator means had not been activated during said predetermined time period.

8. The apparatus as defined by claim 7 wherein said at least one other electronic control circuit comprises a flip-flop circuit.

9. The apparatus as defined by claim 1 wherein said starting means includes switch means and said first cir-

cuit means additionally includes a one-shot pulse generator generating a start of play pulse upon actuation of said starting switch means, said start of play pulse comprising said first type input signal coupled to said control circuit.

10. The apparatus as defined in claim 9 wherein said one shot pulse generator comprises a flip-flop circuit and a transistor multivibrator having its operation enabled and inhibited by the output state of said flip-flop circuit, and additionally including semiconductor diode means coupling said flip-flop circuit to said multivibrator whereby the output state of said flip-flop enables said multivibrator to generate a pulse after a predetermined delay when said starting means is activated and circuit means coupling said multivibrator pulse back to said flip-flop causing said flip-flop to switch states whereupon the opposite output state of said flip-flop inhibits further operation of said multivibrator.

11. The apparatus as defined in claim 9 wherein said second circuit means additionally includes an electronic timing circuit coupled to said one shot pulse generator and being responsive to said start of play pulse generated thereby to produce an output signal after a second predetermined time delay comprising another second type input signal, said input signal being applied to all said control circuits for rendering said respective clock oscillators inoperative after a predetermined time interval in the event said respective player operated switch means have not been actuated.

12. The apparatus as defined by claim 11 wherein said timing circuit comprises a flip-flop circuit and a transistor multivibrator having its operation enabled and inhibited by the output state of said flip-flop circuit and additionally including feedback means coupled from said multivibrator back to the input of said flip-flop circuit, said flip-flop circuit additionally including input circuit means coupled to said one shot pulse generator being responsive to the start of play pulse generated thereby to become set to a first output state and enabling said multivibrator which after said second predetermined time interval generates an output pulse signal which is fed back to the input of said multivibrator, causing said flip-flop to switch to the opposite output state and inhibiting further operation of said multivibrator.

13. The apparatus as defined by claim 12 wherein said variable frequency oscillator comprises a unijunction transistor oscillator having frequency adjusting circuit means coupled thereto.

14. The apparatus defined by claim 11 wherein each said electronic clock oscillator comprises a variable frequency oscillator.

15. The apparatus as defined in claim 9 wherein each said control circuit comprises a flip-flop circuit.

16. The apparatus as defined by claim 15 wherein each said display driver circuit comprises an electronic ring counter including a plurality of electronically controlled switches respectively connected to a selected lamp in said display unit, said controlled switches being operable to sequentially become conductive in response to the pulsed output of said clock oscillator to energize said lamps in said display units.

17. The apparatus as defined by claim 1 and additionally including circuit means initially setting said control circuit to said first output state, a timer circuit coupled to said control circuits for individually switching said control circuits to said second output state after a pre-

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determined time period without the operation of a player;

first player operated circuit means coupled to each said control circuit for switching the respective control circuit to said first output state after said predetermined time period; and

second player operated circuit means coupled to each said control circuit for switching the respective control circuit to said second output state after said respective first player operated circuit means is activated.

18. The apparatus as defined by claim 17 and addi-

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tionally including a second timer for individually switching said binary control circuits to said first output state after a second predetermined time period without the operation of said first and second player operated means.

19. The apparatus as defined in claim 1 and additionally including third circuit means coupled to said first and second circuit means and each driver circuit means for establishing an initial operating state of said circuits when power is first applied.

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