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54 **Electronic dice game apparatus.**

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**EP 0 056 819 B1**

## Description

### Technical field

This invention relates to electronic dice game apparatus.

### Background art

There are already known a number of games based on dice. Dice may take two forms. In the first form, known as "spot dice", the six faces of each dice show respectively one, two, three, four, five and six dots. In the second form, known as "poker dice", the six faces of each dice show respectively pictures depicting the nine, ten, jack, queen, king and ace of a pack of cards.

In an article entitled "Poker" in the periodical *Elektor*, issued July/August 1976, there is described a circuit for an electronic game based on liar dice. This circuit includes five display devices each of which is capable of displaying the six faces of a poker dice. A set button is provided for each display device. Each display device is driven by an individual shift register clocked by an individual oscillator. A single start button and a single stop button are provided for simultaneously starting and stopping all five oscillators. In operation, one or more set buttons are pressed and then the start button is pressed. This causes the display of the selected display devices to change randomly. When the stop button is pressed, the result of the "throw" can be read on the display devices.

This circuit suffers from a number of disadvantages. The circuit is awkward to operate because the player must press the set button for each selected display device and must then press both the start button and the stop button to make his throw. The circuit makes no provision for rendering the display device unreadable. Because all five oscillators stop instantaneously when the stop button is pressed, a skilled player may learn how to influence the resulting throw by selecting the instant at which he presses the stop button. Also, it is recognized that many players have difficulty in using poker dice as opposed to spot dice when playing the game of liar dice.

Another later issued article, entitled "Electronic poker dice", in the same periodical *Elektor* (July/August 1979), discloses a similar dice game in which a "shaker button" permits to render the display devices readable, i.e. to "uncover the dice". But, put apart this feature, the apparatus suffers from the same disadvantages as the ones inherent in the apparatus of *Elektor* 1976.

It is an object of this invention to provide a new or improved dice game apparatus in which the disadvantages set out above are reduced or eliminated.

According to this invention there is provided a dice game apparatus comprising a plurality of electric display devices each capable of displaying a number of alternative display configurations, a player operable roll device for randomly changing the configuration of all of said display devices, a hold device associated with each dis-

play device and capable of preventing the configuration of the associated display device from changing, and a cancelling device for deactuating the hold device, characterized in that the player operable roll device comprises a single player operable roll button, means responsive to operation of the roll button for randomly changing the display configurations and delay means for causing the display configurations to continue changing for a period after operation of the single roll button, each hold device comprises an individual hold button and individual means associated with the hold button for preventing the configuration of the associated display device from changing upon operation of the hold button, the cancelling device comprises a single cancel button and means for deactuating all the hold devices upon operation of the cancel button, each display device is capable of displaying six different configurations corresponding respectively to the six different faces of spot dice, and the apparatus further includes a blanking button and means responsive to operation of the blanking button for alternately rendering the display devices readable and unreadable.

### Brief description of drawings

Figure 1 is a plan view of an apparatus embodying this invention; and

Figure 2 is a circuit diagram of the apparatus shown in Figure 1.

### Best method of carrying out the invention

Referring now to Figure 1 there is shown the face 1 of an apparatus for playing a game based on dice suitable for 2 or more players. The face is mounted on a case which encloses the electronic circuitry of the apparatus and the case is of suitable dimensions for holding in the hand.

The face comprises five dice or display devices 2 to 6, a roll button 7, five hold buttons 8 to 12 associated respectively with the display devices 2 to 6, a hold cancel button 13, and a blanking button 14. Each display device consists of seven light emitting diodes (LEDs) arranged in an array at positions corresponding to the dots on a spot dice, i.e. with four LEDs at four corner positions, two more at the centre of two opposite sides and the seventh LED at the centre.

As will be explained in more detail hereinafter, each of the display devices normally displays a configuration of lit LEDs corresponding to one face of a spot dice.

When the roll button 7 is depressed the configuration changes in a random manner. If one of the hold buttons is pressed, its associated display device is prevented from changing configuration but this hold action may be cancelled by pressing the cancel button 13. The display may be blanked by pressing the blanking button 14 and then returned by pressing the blanking button 14 a second time.

In order to play the game, the first player presses the roll button 7, and then releases it. After roll button 7 is released, the display con-

tinues to change for a short period. When the display stops changing, the player notes the resulting throw displayed on the five dice 2 to 6, removes the display by pressing the blanking button 13, and calls this throw. His call may be true or false. He then passes the apparatus to the next player who may accept the call or challenge it prior to unblinking the display. If he challenges, then the first player loses a stake if his call is higher than the actual throw but otherwise the challenger loses. If he accepts, he may press the roll button after optionally pressing one or more of the hold buttons and play then proceeds as before until a challenge occurs. Each successive player must call a higher throw.

The calls rank as follows commencing with the highest call: five of a kind (e.g. 5 "threes"), four of a kind, three of a kind plus two of another kind, a "high run" i.e. "six", "five", "four", "three" and "two", a "low run" i.e. "five", "four", "three", "two" and "one", three of a kind, two pairs, and lastly one pair.

Referring now to Figure 2, there is shown the circuit diagram for the apparatus. The circuit includes a battery 15 the positive pole of which is connected to a +5V rail and the negative pole of which is connected to a 0V rail. The +5V rail is connected through a roll switch 7A, operated by the roll button 7, and a pair of resistors 16 and 17 connected in series to the 0V rail. The resistors 16 and 17 are bridged by a capacitor 18. The junction of switch 7A and resistor 16 is connected to the input of a Schmitt inverter 19, the output of which is connected to the input of a further Schmitt inverter 20.

Also shown in Figure 2 are the seven light emitting diodes 2A to 2G of the display device 2. The light emitting diodes are driven by a channel circuit generally indicated at 21 and which will be described in more detail hereinafter. Each set of seven diodes which respectively form the display devices 3 to 6 are driven by four further channel circuits which are identical to the circuit 21. These further channel circuits and their associated diodes are not shown in Figure 2.

The apparatus further includes a blanking circuit 22, and a sound circuit 23, both of which will be described in more detail hereinafter.

The channel circuit 21 includes a counter/decoder which includes a pair of NOR gates 30, 31, a NAND gate 32, and three flip-flops 33 to 35. The clock input CLK of flip-flop 35 receives clock pulses from an oscillator 36 to be described, and its S and R inputs are connected to the 0V rail. The  $\bar{Q}$ - output of flip-flop 35 is connected to its D input and the  $\bar{Q}$ - output also drives LED 2A. The Q output of flip-flop 35 is connected to the clock input of flip-flop 34 and also to one input of NOR gate 31. The S input of flip-flop 34 is connected to the output of NOR gate 31 and the R input is connected to the 0V rail. The Q output is connected to another input of NOR gate 31, to the clock input of flip-flop 33, to one input of NOR gate 30, and to one input of NAND gate 32. The  $\bar{Q}$  output is connected to the D input. The S input of

flip-flop 33 is connected to the output of NOR gate 31 and the R input is connected to the 0V rail. The Q output of flip-flop 33 is connected to the third input of NOR gate 31, the other input of NOR gate 30, and the other input of NAND gate 32. The  $\bar{Q}$  output of flip-flop 33 is connected to the D input and the  $\bar{Q}$  output drives LEDs 2F and 2G. NOR gate 30 drives LEDs 2B and 2C and the NAND gate 32 drives the LEDs 2D and 2E.

The counter/decoder operates as a divide by six counter with LED 2A being turned on and off by alternate pulses from the oscillator to indicate odd and even counts, diodes 2F and 2G turning on and off on the fourth, fifth and sixth count, LEDs 2B and 2C turning on for all the counts except for the first, and diodes 2D and 2E turning on for the sixth count only.

The oscillator 36 comprises a NAND gate 37 and a NOR gate 38, the output of NOR gate 38 providing the clock pulses and being connected to its input through a capacitor 39 and a resistor 70. The junction of capacitor 39 and resistor 70 is connected through a resistor 71 to one input of NAND gate 37, the output of which is connected to both inputs of NOR gate 38. The values of capacitor 39 and resistor 71 are identical to the values of the corresponding components in the remaining four channel circuits but the value of the resistor 70 and the corresponding resistors in the other channel circuits differ from channel to channel to cause the oscillators of different channels to run at different frequencies.

The oscillator 36 is controlled by a NAND gate 138, the two inputs of which are connected to the output of a further NAND gate 139. One input of NAND gate 139 is connected to the junction of resistors 16 and 17, the junction of resistors 16 and 17 also being connected to one input of identical NAND gates in the remaining channel circuits. The other input of NAND gate 139 is connected to the  $\bar{Q}$  output of a flip-flop 40. The clock input of flip-flop 40 is connected to the output of Schmitt inverter 19, the output of Schmitt inverter 19 also being connected to the clock input of identical flip-flops in the other channel circuits. The D input of flip-flop 40 is connected to the 0V rail. The S input of flip-flop 40 is connected through a hold switch 8A operated by the hold button 8 to a rail 57, and the S input is also connected to the 0V rail through a pull-down resistor 41. The R input of flip-flop 40 is connected through a cancel switch 13A to the +5V rail, the cancel switch 13A being operated by the cancel button 13 and being common to all five channel circuits. The R input is also connected to the 0V rail through a pull-down resistor 42 and the junction of pull down resistor 42 and cancel switch 13A is connected to the R input of flip-flops corresponding to the flip-flop 40 in the remaining channel circuits.

If the roll switch 7A is closed with the  $\bar{Q}$  outputs of flip-flop 40 and the corresponding flip-flops in the remaining channel circuits high, then oscillator 36 and the corresponding oscillators in the remaining circuits will start to run thereby

changing the display. When the switch 7A is released, capacitor 18 will discharge so the signal at the junction of resistors 16 and 17 will fall. When the signal applied from this junction to the input of NAND gate 139 falls below the threshold of this NAND gate, oscillator 36 will stop running and the display on LEDs 2A to 2G will cease changing. Likewise, in each of the remaining channels, when the input signal applied to the input of a NAND gate which corresponds to NAND gate 139 falls below its threshold value, the oscillator will stop and the display will cease changing. As the NAND gate 139 and the corresponding NAND gates in the remaining channel circuits will all have slightly different threshold values, a further element of randomness will be introduced to that established by making the oscillator frequencies different.

If the hold switch 8A is closed, then the  $\bar{Q}$  output of flip-flop 40 will go low thereby preventing the oscillator 36 from running. A similar result will be obtained by closing the hold switches in the remaining channel circuits. If one of the hold switches is closed in error, then all the flip-flops corresponding to flip-flop 40 may be reset by closing the cancel switch 13A. Also, a short time after the roll switch 7A is released, all the flip-flops corresponding to flip-flop 40 will be reset by a clock signal from Schmitt inverter 19.

In the blanking circuit 22, the +5V rail is connected through a blanking switch 14A operated by blanking button 14, and a pair of resistors 50 and 51, connected in series, to the 0V rail. The resistor 51 is bridged by a capacitor 52 and the junction of resistors 50 and 51 is connected to the input of a Schmitt inverter 53. The output of Schmitt inverter 53 is connected to the clock input of a flip-flop 44. The J and K inputs of flip-flop 54 are connected to the +5V rail. The Q output of flip-flop 54 is connected through a resistor 55 to the base of a PNP transistor 56, the emitter of which is connected to the +5V rail and the collector of which is connected to the rail 57, which is the supply rail for the LEDs. In operation, the supply rail 57 will be alternately energised and de-energised by successive closures of the blanking switch 14A.

The sound circuit 23 comprises three oscillators 60, 61 and 62. The input of oscillator 60 is connected to the junction of cancel switch 13A and resistor 42 and the output of this oscillator provides an input signal to oscillator 62. The input of oscillator 61 is connected to the output of Schmitt inverter 20 and the output of this oscillator provides a further input signal to oscillator 62. The oscillator 62 also receives an input signal from the output of a NAND gate 63, the two inputs of which are connected to the output of a NOR gate 64. The NOR gate 64 has five inputs, one of which is connected to the junction of hold switch 8A and resistor 41 in channel circuit 21 and the remaining inputs are connected to corresponding junctions in the remaining channel circuits. The output of oscillator 62 is connected through a pair of NAND gates 65 and 66 to one side of an acoustic transducer 67, the other side of which is connected to the 0V rail. The oscillators 60, 61 and 62 are

tuned to different frequencies so as to produce three tones. Each time the roll switch 7A, or the cancel switch 13A or one of the hold switches is depressed, a tone signal will be emitted by the transducer 67.

The example of the invention described above makes use of separate oscillators for the individual channel circuits. It will be appreciated, however, that other arrangements could be employed in which there is a single oscillator, dividing circuits being employed to cause the counters to run at different frequencies. Alternatively, the counters could be cascaded. As yet a further alternative there could be a single counter and a read only memory addressed by the counter and providing output signals to drive the LEDs of all the display devices. In any of these cases the hold arrangement could be in the form of a separate latch for each display device.

Other forms of display blanking means could also be used such as a hinged flap movable to a display covering position.

As an alternative to the light emitting diodes described above, the display devices could employ liquid crystal devices.

#### Claims

1. Electronic dice game apparatus comprising a plurality of electric display devices (2 to 6) each capable of displaying a number of alternative display configurations, a player operable roll device (7, 7a, 16, 17, 18, 30 to 36, 139) for randomly changing the configurations of all of said display devices (2 to 6), a hold device (8 to 12, 8a, 40) associated with each display device (2 to 6) and capable of preventing the configuration of the associated display device from changing, and a cancelling device, (13, 13a) for deactuating the hold devices (8 to 12, 8a, 40), characterized in that the player operable roll device comprises a single player operable roll button (7), means (7a, 30 to 36) responsive to operation of the roll button (7) for randomly changing the display configurations and delay means (16, 17, 18, 139) for causing the display configurations to continue changing for a period after operation of the single roll button (7), each hold device comprises an individual hold button (8 to 12) and individual means (8a, 40) associated with the hold button (8 to 12) for preventing the configuration of the associated display device (2 to 6) from changing upon operation of the hold button (8 to 12), the cancelling device comprises a single cancel button (13) and means (13a) for deactuating all the hold devices upon operation of the cancel button, each display device (2 to 6) is capable of displaying six different configurations corresponding respectively to the six different faces of spot dice, and the apparatus further includes a blanking button (14) and means (14a, 50 to 56) responsive to operation of the blanking button (14) for alternately rendering the display devices (2 to 6) readable and unreadable.

2. Apparatus as claimed in claim 1, characterised in that the cancelling device further includes

means for automatically deactuating all the hold devices (8 to 12, 8a, 40) at the end of each change operation.

3. Apparatus as claimed in claim 1 or claim 2, characterised in that the delay means (16, 17, 18, 139) is arranged so that the periods during which the individual display devices (2 to 6) continue to change after operation of the roll button (7) are not all identical.

4. Apparatus as claimed in one of the preceding claims, characterised in that the means (7a, 30 to 36) for randomly changing the display configuration includes an individual oscillator (36) for changing the display configuration of each display device (2 to 6), the individual oscillators being set to different frequencies.

5. Apparatus as claimed in any one of the preceding claims, characterised in that there are five display devices (2 to 6).

6. Apparatus as claimed in any one of the preceding claims, characterised in that each display device (2 to 6) is a liquid crystal display device.

#### Patentansprüche

1. Elektronisches Würfelspiel-Gerät mit einer Vielzahl von elektrischen Anzeigen (2 bis 6), von denen jede eine Anzahl von alternativen Anzeigekonfigurationen darstellen kann, mit einer vom Spieler betätigbaren Rolleinrichtung (7, 7a, 16, 17, 18, 30 bis 36, 139), um die Konfigurationen aller Anzeigen (2 bis 6) zufällig zu verändern, mit einer Halteeinrichtung (8 bis 12, 8a, 40), die jeder Anzeige (2 bis 6) zugeordnet ist und eine Änderung der Konfiguration der zugeordneten Anzeige verhindern kann, sowie mit einer Löscheinrichtung (13, 13a), um die Halteeinrichtungen (8 bis 12, 8a, 40) außer Betrieb zu setzen, dadurch gekennzeichnet, daß die vom Spieler betätigbare Rolleinrichtung eine einzige vom Spieler betätigbare Rolltaste (7), eine Einrichtung (7a, 30 bis 36), die auf die Betätigung der Rolltaste (7) anspricht, um die Anzeigekonfigurationen zufällig zu ändern, sowie eine Verzögerungseinrichtung (16, 17, 18, 139) enthält, um eine fortdauernde Änderung der Anzeigekonfigurationen für ein Zeitintervall nach der Betätigung der einzigen Rolltaste (7) zu veranlassen, wobei jede Halteeinrichtung eine eigene Haltetaste (8 bis 12) sowie eine eigene Einrichtung (8a, 40) enthält, die der Haltetaste (8 bis 12) zugeordnet ist, um eine Änderung der Konfiguration der zugeordneten Anzeige (2 bis 6) bei der Betätigung der Haltetaste (8 bis 12) zu verhindern, wobei die Löscheinrichtung eine einzige Löschtaste (13) sowie eine Einrichtung (13a) enthält, um alle Halteeinrichtungen bei der Betätigung der Löschtaste außer Betrieb zu setzen, wobei jede Anzeige (2 bis 6) sechs unterschiedliche Konfigurationen darstellen kann, die jeweils den sechs verschiedenen Augenflächen eines Würfels entsprechen, und wobei das Gerät weiters eine Ausblendtaste (14) sowie ein Einrichtung (14a, 50 bis 56) aufweist, die auf die Betätigung der Ausblendtaste (14) anspricht, um abwech-

selnd die Anzeigen (2 bis 6) lesbar und unlesbar zu machen.

2. Gerät gemäß Anspruch 1, dadurch gekennzeichnet, daß die Löscheinrichtung weiters eine Einrichtung enthält, um alle Halteeinrichtungen (8 bis 12, 8a, 40) am Ende eines jeden Wechsellvorgangs automatisch außer Betrieb zu setzen.

3. Gerät gemäß Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Verzögerungseinrichtung (16, 17, 18, 139) so aufgebaut ist, daß die Zietintervalle, während denen sich die einzelnen Anzeigen (2 bis 6) nach der Betätigung der Rolltaste (7) weiter ändern, nicht alle ident sind.

4. Gerät gemäß allen bisherigen Ansprüchen, dadurch gekennzeichnet, daß die Einrichtung (7a, 30 bis 36) für die zufällige Änderung der Anzeigekonfiguration einen eigenen Oszillator (36) aufweist, um die Anzeigekonfiguration jeder Anzeige (2 bis 6) zu verändern, wobei die einzelnen Oszillatoren auf verschiedene Frequenzen eingestellt sind.

5. Gerät gemäß jedem der bisherigen Ansprüche, dadurch gekennzeichnet, daß fünf Anzeigen (2 bis 6) vorgesehen sind.

6. Gerät gemäß jedem der bisherigen Ansprüche, dadurch gekennzeichnet, daß jede Anzeige (2 bis 6) eine Flüssigkristall-Anzeige ist.

#### Revendications

1. Appareil électronique pour jouer aux dés, comprenant un certain nombre de dispositifs d'affichage électrique (2 à 6) qui sont chacun capables d'afficher alternativement un certain nombre de configurations d'affichage, un dispositif de lancer (7, 7a, 16, 17, 18, 30 à 36, 139) actionnable par le joueur pour modifier au hasard les configurations de tous lesdits dispositifs d'affichage (2 à 6), un dispositif de maintien (8 à 12, 8a, 40) associé à chaque dispositif d'affichage (2 à 6) et capable d'empêcher la configuration du dispositif d'affichage associé de changer, et un dispositif d'annulation (13, 13a) pour désactiver les dispositifs de maintien (8 à 12, 8a, 40), caractérisé en ce que le dispositif de lancer actionnable par le joueur comprend un unique bouton de lancer (7) actionnable par le joueur, des moyens (7a, 30 à 36) réagissant à l'actionnement du bouton de lancer (7) pour modifier au hasard les configurations affichées, et des moyens de temporisation (16, 17, 18, 139) pour engendrer la modification continue des configurations affichées pendant une période donnée à la suite de l'actionnement de l'unique bouton de lancer (7), en ce que chaque dispositif de maintien comprend un bouton de maintien individuel (8 à 12) et des moyens individuels (8a, 40) respectivement associés à chaque bouton de maintien (8 à 12) pour empêcher, lorsque le bouton de maintien (8 à 12) est actionné, la configuration du dispositif d'affichage (2 à 6) associé de changer, en ce que le dispositif d'annulation comprend un unique bouton d'annulation (13) et des moyens (13a) pour désactiver tous les dispositifs de maintien lorsque le bouton d'annulation est actionné, en ce que

chaque dispositif d'affichage (2 à 6) est capable d'afficher six configurations différentes correspondant respectivement aux six faces différentes d'un dé à points, et en ce que l'appareil comprend en outre un bouton d'occultation (14) et des moyens (14a, 50 à 56) réagissant à l'actionnement de bouton d'occultation (14) pour rendre alternativement les dispositifs d'affichage (2 à 6) lisibles et illisibles.

2. Appareil selon la revendication 1, caractérisé en ce que le dispositif d'annulation comprend en outre des moyens pour désactiver automatiquement tous les dispositifs de maintien (8 à 12, 8a, 40) à la fin de chaque opération de changement.

3. Appareil selon la revendication 1 ou 2, caractérisé en ce que les moyens de temporisation (16, 17, 18, 139) sont disposés de telle sorte que les périodes pendant lesquelles les différents dispositifs d'affichage (2 à 6) changent en continu

de configuration à la suite de l'actionnement du bouton de lancer (7) ne sont pas toutes identiques.

4. Appareil selon une quelconque des revendications précédentes, caractérisé en ce que les moyens (7a, 30 à 36) pour modifier au hasard les configurations affichées comprennent un oscillateur individuel (36) pour modifier la configuration d'affichage de chaque dispositif d'affichage (2 à 6), les différents oscillateurs étant réglés à des fréquences différentes.

5. Appareil selon une quelconque des revendications précédentes, caractérisé en ce qu'il y a cinq dispositifs d'affichage (2 à 6).

6. Appareil selon une quelconque des revendications précédentes, caractérisé en ce que chaque dispositif d'affichage (2 à 6) est un dispositif d'affichage à cristaux liquides.

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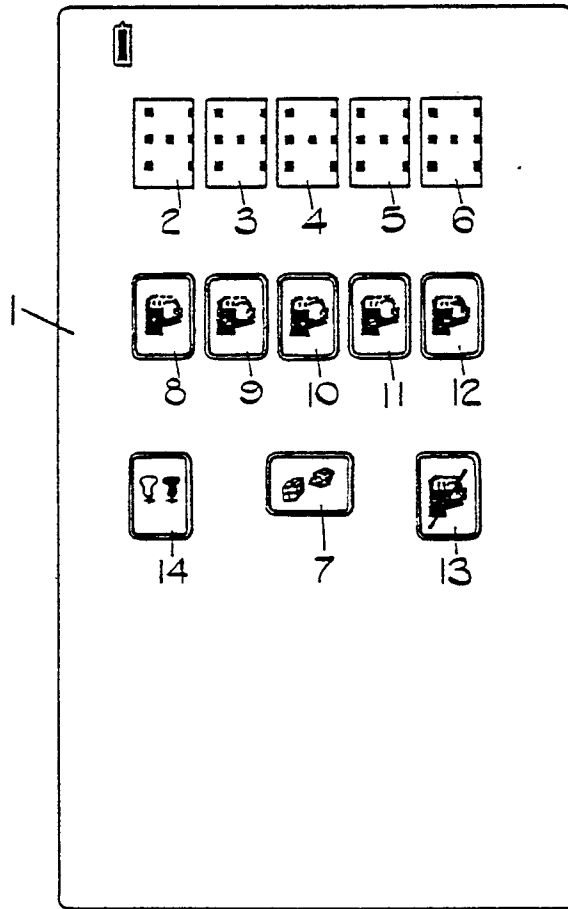


FIG. 1.

FIG. 2.

