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(54) **A sudoku game device**

(57) The present invention provides a Sudoku game device, including: a housing; a display device disposed in but protruding from the housing and capable of displaying a plurality of seven-segment numbers in different colors; at least an input key disposed in but protruding from the housing, wherein users can input, select, or operate with the input key; a printed circuit board disposed

in the housing to accommodate the devices described below; a controller disposed on the printed circuit board and coupled with the input key to receive input instructions from the input key to execute self-created puzzles or other operations; and a driving device disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to drive the display device to display the number.

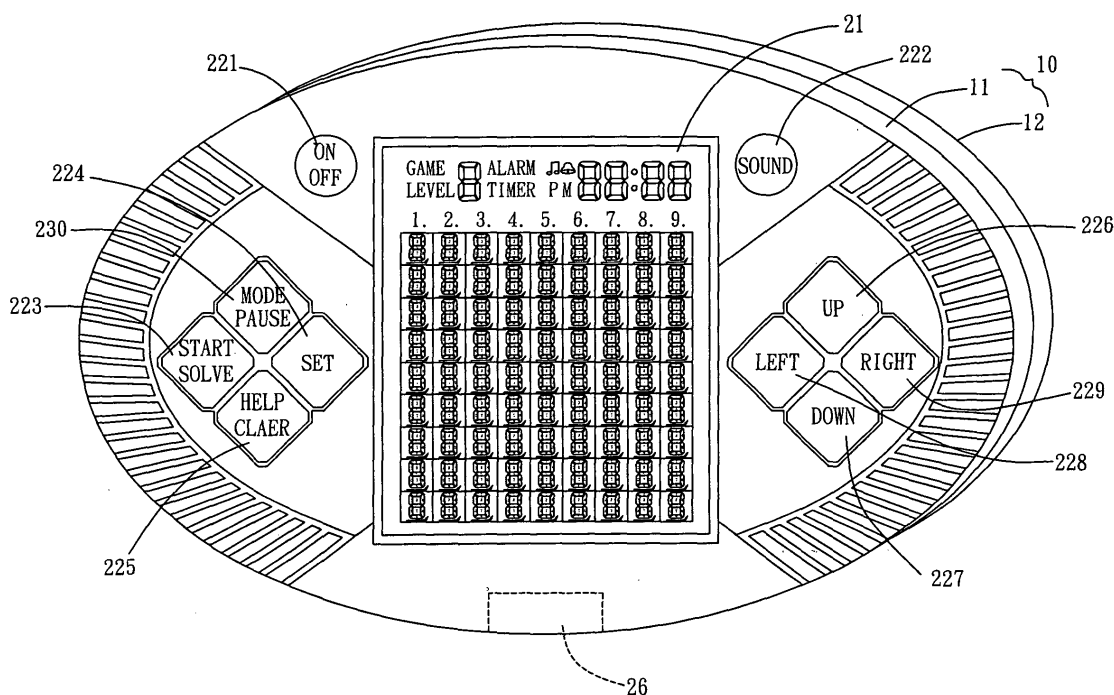


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a Sudoku game device, and in particular, to a Sudoku game device which users can create their own puzzles, has the function of a calculator, has a display which can display a plurality of seven-segment numbers in different colors, and has an extension slot for users to insert various memory cards.

BACKGROUND OF THE INVENTION

[0002] In the popular number puzzle Sudoku, for example, the numbers 1 to 9 are filled into a 3×3 block with the restriction that each number can only appear once in every row and column. However, numbers displayed in the conventional number puzzle device do not have any marking function. Users can fill one possible number into one of the empty blocks, and if the number filled is incorrect, a number has to be filled in again until it is correct. In this way, pen and paper are necessary to record the numbers which have already been tried to avoid a number being filled twice, causing inconvenience to users.

[0003] Furthermore, the prior art Sudoku game device generally used a monochrome LCD display to display seven-segment numbers, therefore, the user could not easily identify the number he/she wanted to input when there were many numbers displayed on the on the LCD display.

SUMMARY OF THE INVENTION

[0004] To solve the shortcoming of the prior art described above, it is an object of the present invention to provide a Sudoku game device, in which a display can display each both adjacent blocks in different colors, offering users with convenient observation and operation.

[0005] To solve the shortcoming of the prior art described above, it is an object of the present invention to provide a Sudoku game device, in which at least one mark can be concealed in the segments of a number, offering users with convenient observation and operation.

[0006] To solve the shortcoming of the prior art described above, it is another object of the present invention to provide a Sudoku game device, in which users can create their own puzzles.

[0007] To solve the shortcoming of the prior art described above, it is another object of the present invention to provide a Sudoku game device, which has the function of a calculator.

[0008] To solve the shortcoming of the prior art described above, it is another object of the present invention to provide a Sudoku game device, which has an extension slot for users to insert various memory cards.

[0009] In order to accomplish the objects of the present invention, the present invention provides a Sudoku game device, including: a housing to accommodate the device described below; a display device disposed in but protruding from the housing and capable of displaying a plurality of seven-segment numbers in different colors; at least an input key disposed in but protruding from the housing, wherein users can input, select, or operate with the input key; a printed circuit board disposed in the housing to accommodate the devices described below; a controller disposed on the printed circuit board and coupled with the input key to receive input instructions from the input key to execute self-created puzzles or other operations; and a driving device disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to drive the display device to display the number.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention can be more fully understood by reference to the following description and accompanying drawings, in which:

[0011] Fig. 1 is a perspective view of a preferred embodiment of a Sudoku game device according to the present invention;

[0012] Fig. 2 is a schematic block diagram of a preferred embodiment of a Sudoku game device according to the present invention;

[0013] Fig. 3a is a schematic illustration of the number 211 provided with the seven segments 212 and the underline 214 according to the present invention;

[0014] Fig. 3b is a schematic illustration of the number 211 provided with the seven segments 212 and the dot 214' according to the present invention; and

[0015] Fig. 4 is a schematic illustration of another preferred embodiment of a Sudoku game device according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] FIGS. 1 and 2 illustrate a perspective view and a schematic block diagram of a preferred embodiment of a Sudoku game device, respectively, according to the present invention. Referring to FIGS. 1 and 2, the Sudoku game device according to the present invention includes a housing 10; a printed circuit board 20, a display device 21, at least an input key 22, a controller 23, and a driving device 24.

[0017] The housing 10 is to accommodate the input key 22, the controller 23, and the driving device 24. The housing 10 further comprises a upper housing 11 and a lower housing 12, both of which contain a plurality of openings and holes of different sizes (not shown) to expose the display device 21 and the input key 22.

[0018] The printed circuit board 20 is disposed in the housing 10 to accommodate the display device 21, the input key 22, the controller 23, and the driving device 24.

[0019] The display device 21 capable of displaying at least a seven-segment number 211 is disposed in the housing 10 and protrudes from the upper housing 11. Furthermore, the number 211 comprises at least one segment having a mark 213. FIG. 3 shows the seven segments 212 of the number 211, which are a, b, c, d, e, f, and g, respectively. The definitions of the segments a, b, c, d, e, f, and g are identical to those of a common seven-segment display device. Also, the display device 21 is, for example but not limited to, a multi-color liquid crystal display device, which can display a plurality of seven-segment numbers 211 in different colors, that is, each adjacent seven-segment number 211 can be displayed in different colors, for example but not limited to black and red colors. Furthermore, some seven-segment numbers 211 can be formed as a 3x3 block 220 (please refer to Fig. 3a), and each adjacent block 220 can be displayed in different colors. Therefore, one block 220 on the display device 21 can be displayed in black, but another adjacent block 220 can be displayed in red so as to reach the goals of offering users with convenient observation and operation.

[0020] The mark 213 can be Arabic numbers 1 to 9, character, or symbol. In the embodiment of the present invention, Arabic numbers 1 to 9 will be used for the purpose of explanation. Also, each mark 213 concealed in the seven segments of the number is unique. For example, the mark is, but not limited to, an Arabic number 1 in the "a" segment; the mark is, but not limited to, an Arabic number 4 in the "b" segment; the mark is, but not limited to, an Arabic number 8 in the "c" segment; the mark is, but not limited to, an Arabic number 9 in the "d" segment; the mark is, but not limited to, an Arabic number 6 in the "e" segment; the mark is, but not limited to, an Arabic number 2 in the "f" segment; the mark is, but not limited to, an Arabic number 5 in the "g" segment; the mark is, but not limited to, an Arabic number 3 in the space encircled by the "a", "b", "f", and "g" segments; and the mark is, but not limited to, an Arabic number 7 in the space encircled by the "c", "d", "e", and "g" segments. Referring to FIGS. 3a and 3b, there is further an underline 214 or a dot 214' under the number to select suitable display device 21 according to different functions.

[0021] Furthermore, the display device 21 can further display characters or symbols, such as game level 215, alarm 216, clock (88:88) 217, tone 218, or timer 219.

[0022] The input key 22 is disposed in the housing 10 and protrudes from the upper housing 11, wherein users can input, select, or operate with the input key 22. Furthermore, the input key 22 comprises at least: a power button 221 (ON/OFF), an audio output button 222 (SOUND), a start button 223 (START/SOLVE), a set button 224 (SET), a help and clear button 225 (HELP/CLEAR), a button to increase number during setting 226 (UP), a button to decrease number during setting 227 (DOWN), a button to move the cursor left 228 (LEFT), a button to move the cursor right 229 (RIGHT), and a button

to change mode and pause 230 (MODE/PAUSE). Furthermore, the function of the button to change mode and pause 230, MODE/PAUSE, includes the following steps: Pressing the button MODE/PAUSE 230 once will show the clock mode; pressing it twice will show the alarm mode; pressing it three times will show the game mode; pressing it four times will return to the clock mode; pressing the button MODE/PAUSE 230 will temporarily stop the game if the button START/SOLVE 223 is being pressed in the game mode. Moreover, depending on the space of the housing 10, the input key 22 further comprises a key pad 240, including numbers 1~9, +, -, ×, ÷, M, C, AC, =, MR, and MC.

[0023] The controller 23 is disposed on the printed circuit board 20 and coupled with the input key 22 to receive input instructions from the input key 22 to execute self-created puzzles or other operations. The procedure for users to create their own puzzles will be described later.

[0024] The driving device 24 is disposed on the printed circuit board 20 and coupled with the controller 23 to receive control instructions from the controller 23 to drive the display device 21 to display the number. The driving device 24 is, for example but not limited to, a driving device for a liquid crystal display device.

[0025] Furthermore, the Sudoku game device according to the present invention further comprises an audio output device 25, which is, for example but not limited to, a speaker. The audio output device 25 is disposed on the printed circuit board 20 and coupled with the controller 23 to receive control instructions from the controller 23 to output audio signals.

[0026] The Sudoku game device according to the present invention further comprises an extension slot 26, which is coupled with the controller 23 and protrudes from the housing 10. Users can insert various memory cards (not shown), in which various puzzles can be saved, into the extension slot 26. Furthermore, the Sudoku game device according to the present invention further comprises a function for users to create their own puzzles. When the game level 215 displays 9, users can create their own puzzles by operating the button to move the cursor left 228 (LEFT)/the button to move the cursor right 229 (RIGHT). Alternatively, users can operate the set button 224 (SET) to enter the mode of setting puzzles and the display device 21 will display SE-P. Then, the entire 3×3 block of the display device 21 will display the underline 214 for users to create their own puzzles.

[0027] Consequently, in the Sudoku game device according to the present invention, users can at most put nine marks 213 onto the seven segments 212 of the seven-segment number 211, offering users a way to input the number 211 into one of the blocks with the input key 22 during a number puzzle. When users input the number 1, for example, the "a" segment will be displayed and the "a" segment has the mark of 1 to remind users. When users input the number 2, for example, the "f" segment will be displayed and the "f" segment has the mark of 2. By analogy, when users input the number 9, the "d" seg-

ment will be displayed and the "d" segment has the mark of 9. Consequently, users can get rid of the trouble of writing down numbers for reference.

[0028] FIG. 4 shows the schematic perspective view of a preferred embodiment of a Sudoku game device according to the present invention. Referring to FIG. 4, the controller 23 of the Sudoku game device in accordance with the present invention further comprises the function of a calculator and the input key 22 further comprises the key pad 240, including numbers 1~9, +, -, ×, ÷, M, C, AC, =, MR, and MC. When using the function of a calculator, users can input number with the number keys 1~9 and then use +, -, ×, ÷, M, C, AC, =, MR, and MC to execute calculation. Furthermore, the numbers input and the calculation result can be displayed on the display device 21. When the controller 23 of the present invention executes the function of a calculator, the display device 21 will display the contents shown in FIG. 3b, in which the number 211 or the dots 214' of the display device 21 display the numbers being input and the calculation result. Alternatively, when the controller 23 is not executing the function of a calculator, the display device 21 will display the content shown in FIG. 3a, in which the number 211 or the underline 214 is shown.

[0029] The Sudoku game device in accordance with the present invention can conceal at least one mark in the segment of a number, offer users to create their own puzzles, have the function of a calculator, have a display which can display both adjacent blocks in different colors and have an extension slot to receive various memory cards which can help users memorize and input puzzles. Consequently, the Sudoku game device in accordance with the present invention can indeed improve the shortcomings of conventional puzzle devices.

[0030] While the invention has been described with reference to the a preferred embodiment thereof, it is to be understood that modifications or variations may be easily made without departing from the spirit of this invention, which is defined by the appended claims.

Claims

1. A Sudoku game device, comprising:

a housing to accommodate the device described below;
a display device disposed in but protruding from the housing and capable of displaying a plurality of seven-segment numbers in different colors;
at least an input key disposed in but protruding from the housing, wherein users can input, select, or operate with the input key;
a printed circuit board disposed in the housing to accommodate the devices described below;
a controller disposed on the printed circuit board and coupled with the input key to receive input instructions from the input key to execute self-

created puzzles or other operations; and
a driving device disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to drive the display device to display the number.

2. The Sudoku game device as defined in claim 1, wherein seven segments of the number are a, b, c, d, e, f, and g, respectively and the definitions of the segments a, b, c, d, e, f, and g are identical to those of a common seven-segment display device; and at least one mark concealed in the seven segments of the number and the mark is unique.
3. The Sudoku game device as defined in claim 2, wherein the mark can be Arabic numbers 1 to 9, character, or symbol; and the mark is an Arabic number 1 in the "a" segment; the mark is an Arabic number 4 in the "b" segment; the mark is an Arabic number 8 in the "c" segment; the mark is an Arabic number 9 in the "d" segment; the mark is an Arabic number 6 in the "e" segment; the mark is an Arabic number 2 in the "f" segment; the mark is an Arabic number 5 in the "g" segment; the mark is an Arabic number 3 in the space encircled by the "a", "b", "f", and "g" segments; and the mark is an Arabic number 7 in the space encircled by the "c", "d", "e", and "g" segments.
4. The Sudoku game device as defined in claim 1, wherein the display device is a multi-color liquid crystal display device and there is a further underline or a dot under the number; and a plurality of seven-segment numbers can be formed as a 3x3 block and each adjacent block can be displayed in different colors.
5. The Sudoku game device as defined in claim 4, wherein the display device can further display characters or symbols, such as game level, alarm, clock, tone, or timer.
6. The Sudoku game device as defined in claim 1, further comprising an audio output device and an extension slot, wherein the audio output device is disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to output audio signals, and the extension slot is coupled with the controller and protruding from the housing for users to insert various memory cards, in which various puzzles can be saved.
7. The Sudoku game device as defined in claim 4, wherein the input key comprises at least: a power button, an audio output button, a start button, a set button, a help and clear button, a button to increase number during setting, a button to decrease number during setting, a button to move the cursor left, a

button to move the cursor right, and a button to change mode and pause.

8. The Sudoku game device as defined in claim 7, wherein the input key further comprises numbers 1~9, +, -, ×, ÷, M, C, AC, =, MR, and MC. 5
9. The Sudoku game device as defined in claim 7, wherein the function of the button to change mode and pause includes the following steps: pressing the button once will show the clock mode, pressing it twice will show the alarm mode, pressing it three times will show the game mode, pressing it four times will return to the clock mode, and pressing the button will temporarily stop the game if the button start/solve is being pressed in the game mode. 10
10. The Sudoku game device as defined in claim 5, wherein the function of creating puzzles is by operating the button to move the cursor left/the button to move the cursor right or operating the set button to enter the mode of setting puzzles to create puzzles; wherein the function of creating puzzles is that when the game level displays 9, users can create their puzzles by operating the button to move the cursor left/the button to move the cursor right, or users can operate the set button to enter the mode of setting puzzles, in which the display device will display SE-P and the entire 3×3 block of the display device will display the underline for users to create their own puzzles. 20
11. The Sudoku game device as defined in claim 8, wherein the controller is capable of executing the function of a calculator, and when the controller is executing the function of a calculator, the number or the dots of the display device display the numbers being input and calculation results, and when the controller is not executing the function of a calculator, the number or the underline will be displayed in the display device. 25

12. A Sudoku game device, comprising: 30

a housing to accommodate the device described below; 45
a display device disposed in but protruding from the housing and capable of displaying a plurality of seven-segment numbers in different colors;
at least an input key disposed in but protruding from the housing, wherein users can input, select, or operate with the input key; 50
a printed circuit board disposed in the housing to accommodate the devices described below;
a controller disposed on the printed circuit board and coupled with the input key to receive input instructions from the input key to execute related operations; and 55

a driving device disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to drive the display device to display the number.

13. The Sudoku game device as defined in claim 12, wherein seven segments of the number are a, b, c, d, e, f, and g, respectively and the definitions of the segments a, b, c, d, e, f, and g are identical to those of a common seven-segment display device; and the mark concealed in the seven segments of the number is unique.
14. The Sudoku game device as defined in claim 13, wherein the mark can be Arabic numbers 1 to 9, character, or symbol; and the mark is an Arabic number 1 in the "a" segment; the mark is an Arabic number 4 in the "b" segment; the mark is an Arabic number 8 in the "c" segment; the mark is an Arabic number 9 in the "d" segment; the mark is an Arabic number 6 in the "e" segment; the mark is an Arabic number 2 in the "f" segment; the mark is an Arabic number 5 in the "g" segment; the mark is an Arabic number 3 in the space encircled by the "a", "b", "f", and "g" segments; and the mark is an Arabic number 7 in the space encircled by the "c", "d", "e", and "g" segments.
15. The Sudoku game device as defined in claim 12, wherein the display device is a multi-color liquid crystal display device and there is a further underline or a dot under the number; and a plurality of seven-segment numbers can be formed as a 3x3 block and each adjacent block can be displayed in different colors.
16. The Sudoku game device as defined in claim 15, wherein the display device can further display characters or symbols, such as game level, alarm, clock, tone, or timer.
17. The Sudoku game device as defined in claim 12, further comprising an audio output device and an extension slot, wherein the audio output device is disposed on the printed circuit board and coupled with the controller to receive control instructions from the controller to output audio signals, and the extension slot is coupled with the controller and protruding from the housing for users to insert various memory cards, in which various puzzles can be saved.
18. The Sudoku game device as defined in claim 15, wherein the input key comprises at least: a power button, an audio output button, a start button, a set button, a help and clear button, a button to increase number during setting, a button to decrease number during setting, a button to move the cursor left, a button to move the cursor right, and a button to

change mode and pause.

19. The Sudoku game device as defined in claim 18, wherein the input key further comprises numbers 1~9, +, -, ×, ÷, M, C, AC, =, MR, and MC. 5

20. The Sudoku game device as defined in claim 18, wherein the function of the button to change mode and pause includes the following steps: pressing the button once will show the clock mode, pressing it 10
twice will show the alarm mode, pressing it three times will show the game mode, pressing it four times will return to the clock mode, and pressing the button will temporarily stop the game if the button start/solve is being pressed in the game mode. 15

21. The Sudoku game device as defined in claim 18, wherein the function of creating puzzles is by operating the button to move the cursor left/the button to move the cursor right or operating the set button to enter the mode of setting puzzles to create puzzles. 20

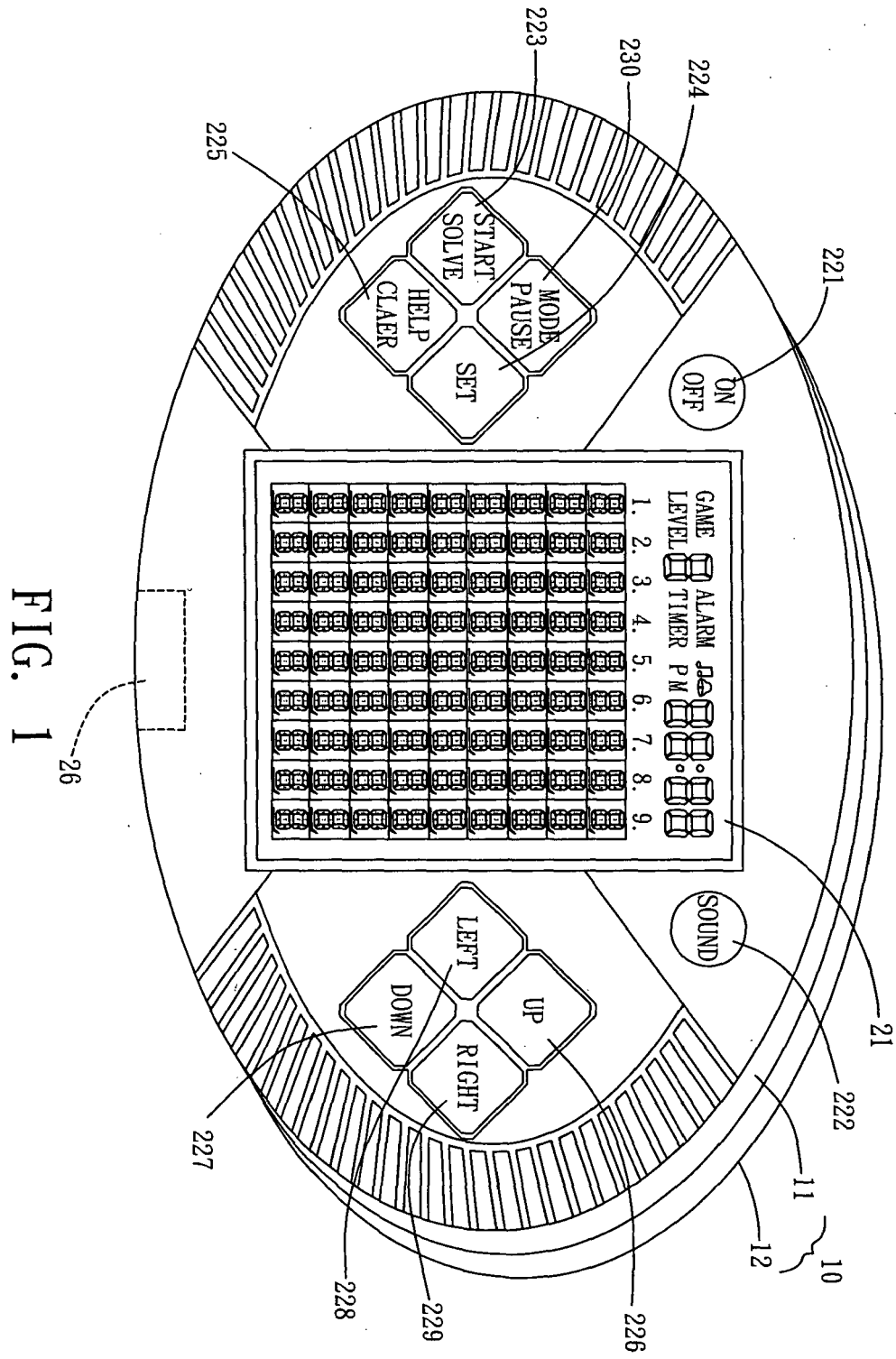
22. The Sudoku game device as defined in claim 21, wherein the function of creating puzzles is that when the game level displays 9, users can create their puzzles by operating the button to move the cursor left/the button to move the cursor right, or users can operate the set button to enter the mode of setting puzzles, in which the display device will display SE-P and the entire 3×3 block of the display device will display the underline for users to create their own puzzles. 25
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23. The Sudoku game device as defined in claim 19, wherein the controller is capable of executing the function of a calculator, and when the controller is executing the function of a calculator, the number or the dots of the display device display the numbers being input and calculation results, and when the controller is not executing the function of a calculator, the number or the underline will be displayed in the display device. 35
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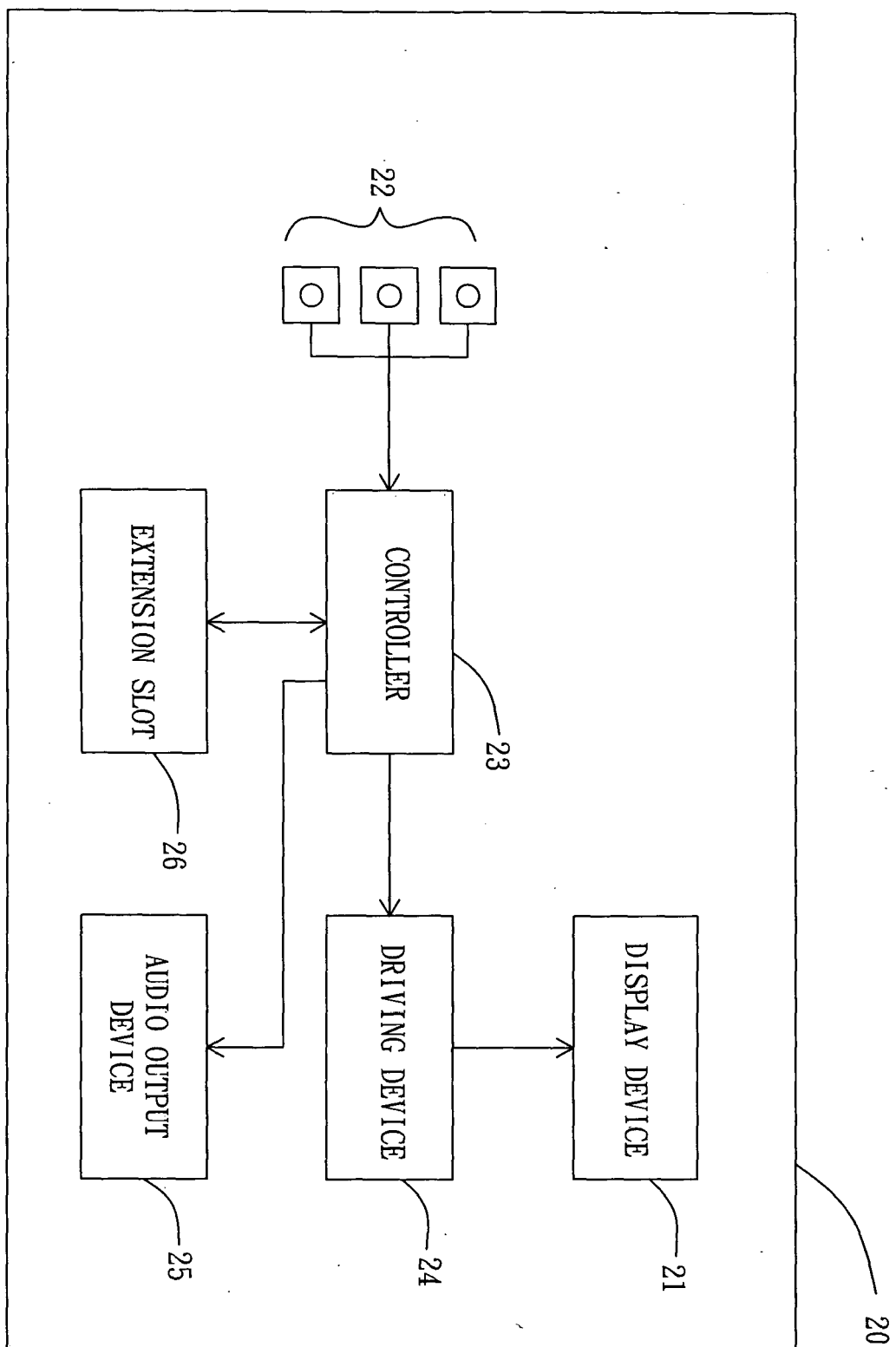


FIG. 2

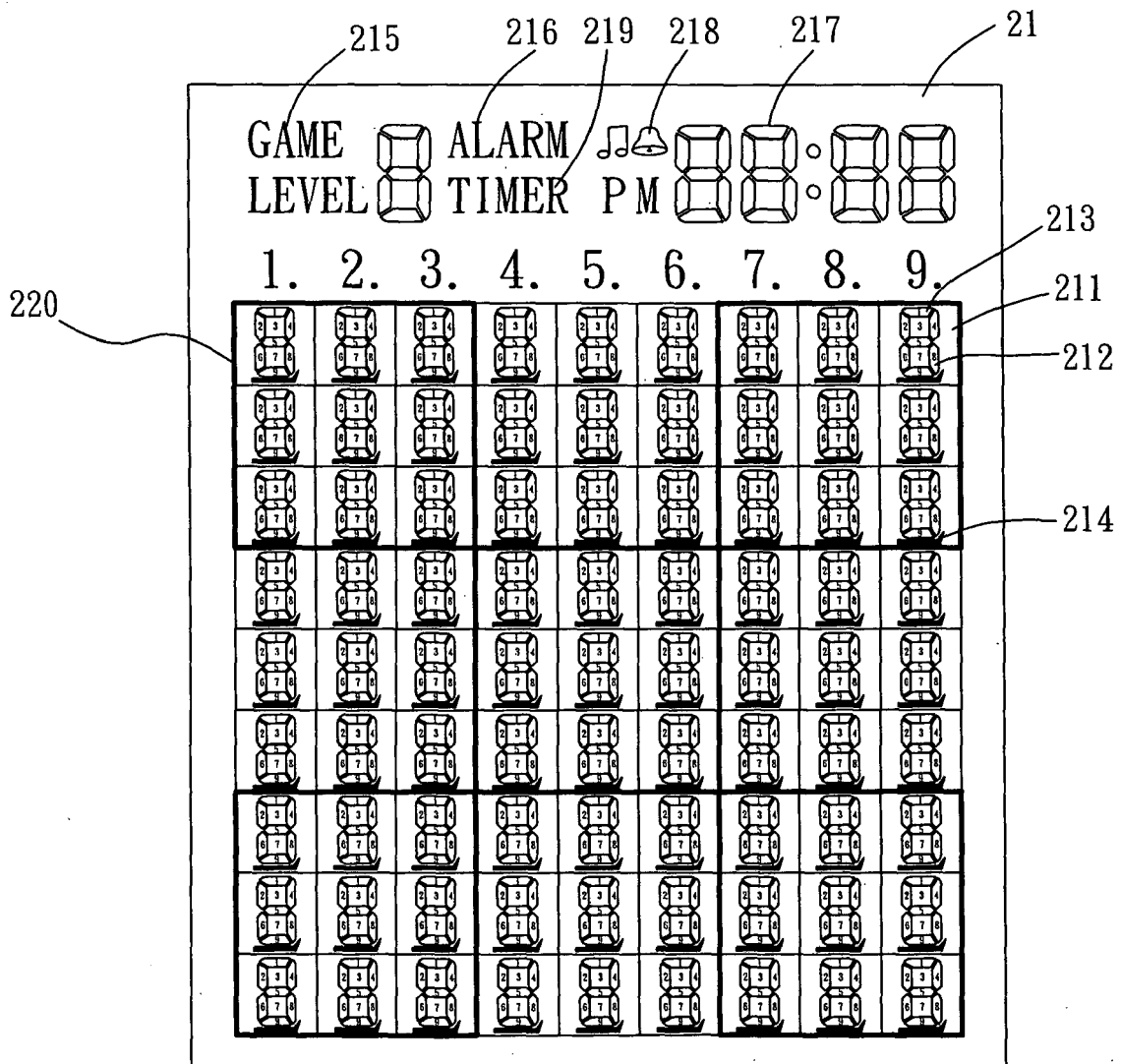


FIG. 3a

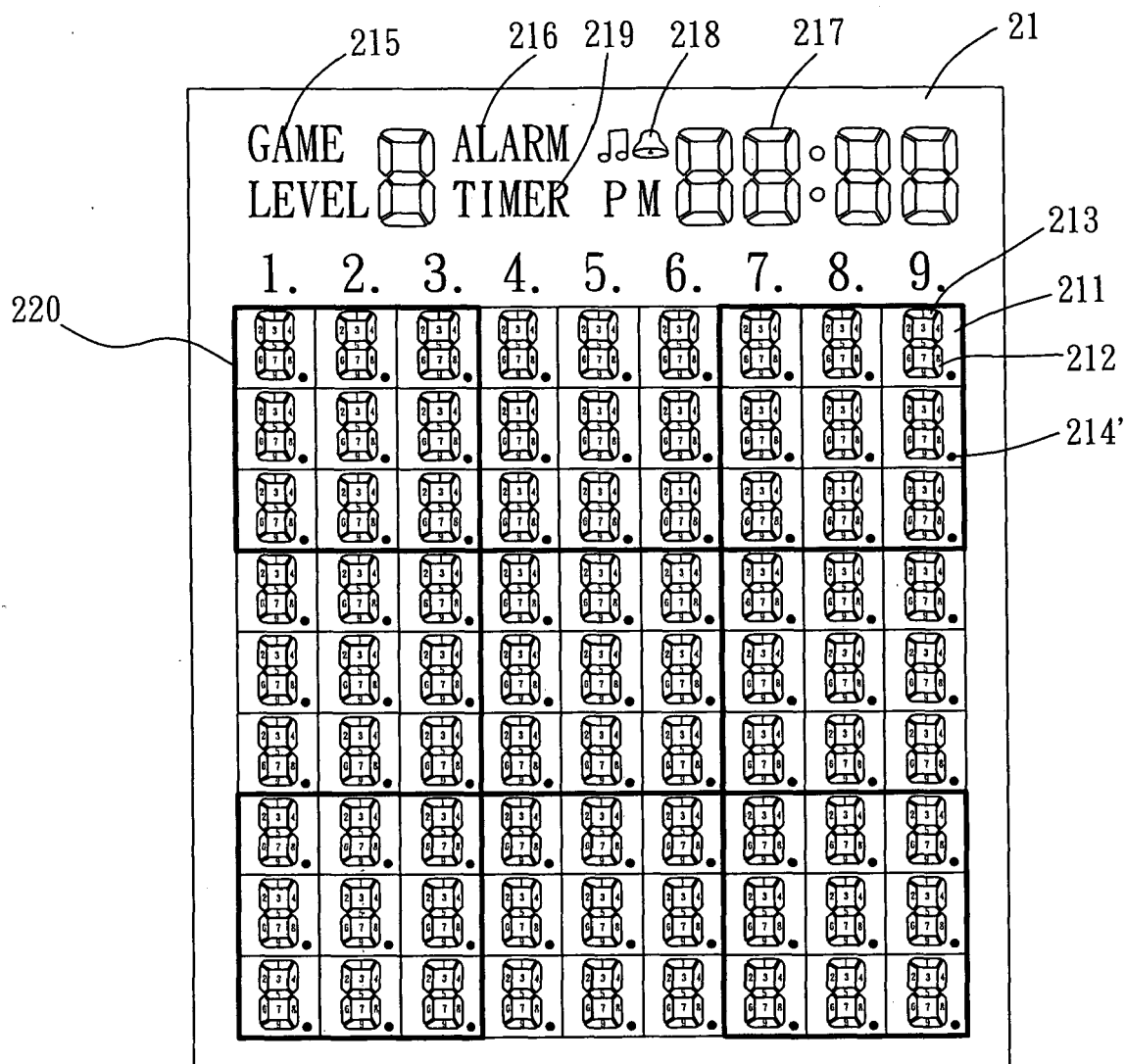


FIG. 3b

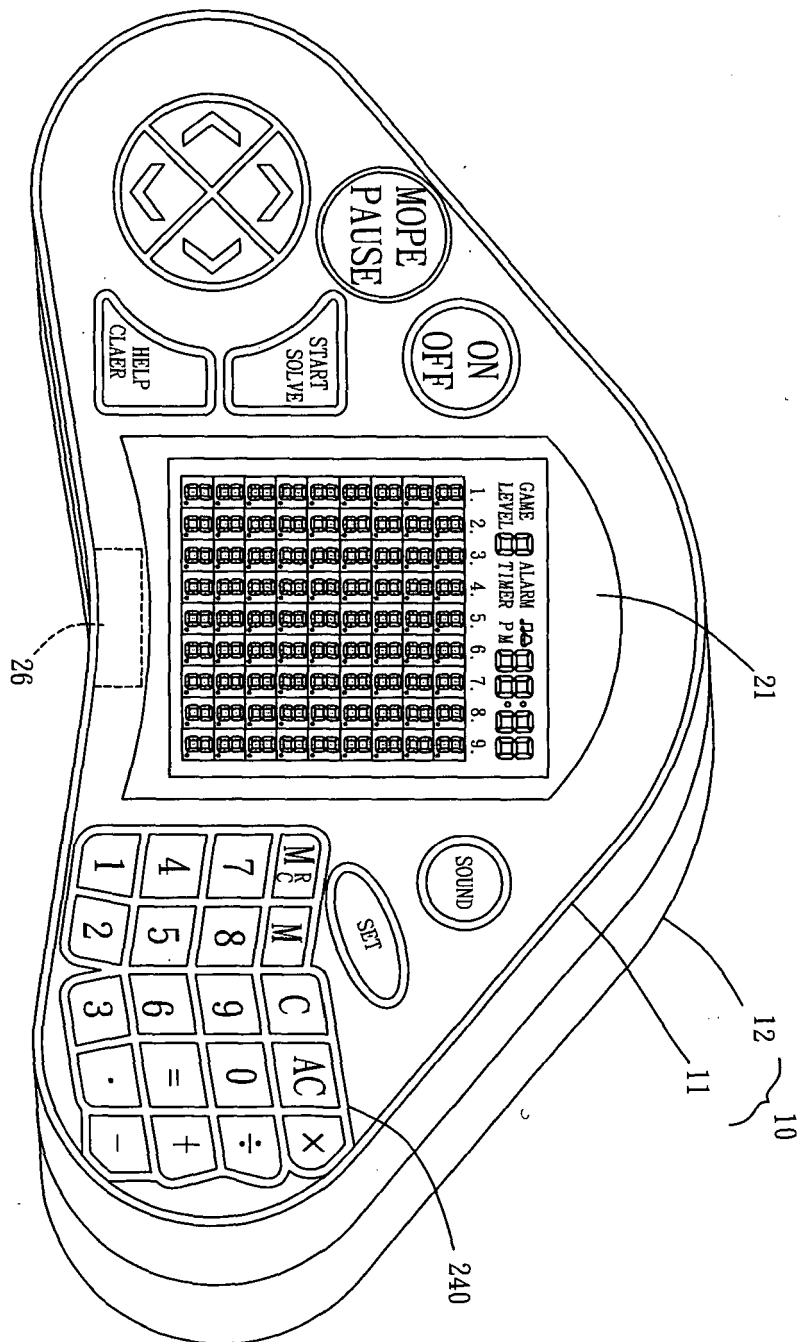


FIG. 4