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(11) **EP 1 453 020 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:

01.09.2004 Bulletin 2004/36

(51) Int Cl.7: **G07F 17/32, G07F 17/34**

(21) Application number: **04003286.4**

(22) Date of filing: **13.02.2004**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**

Designated Extension States:

AL LT LV MK

(30) Priority: **13.02.2003 JP 2003035670**

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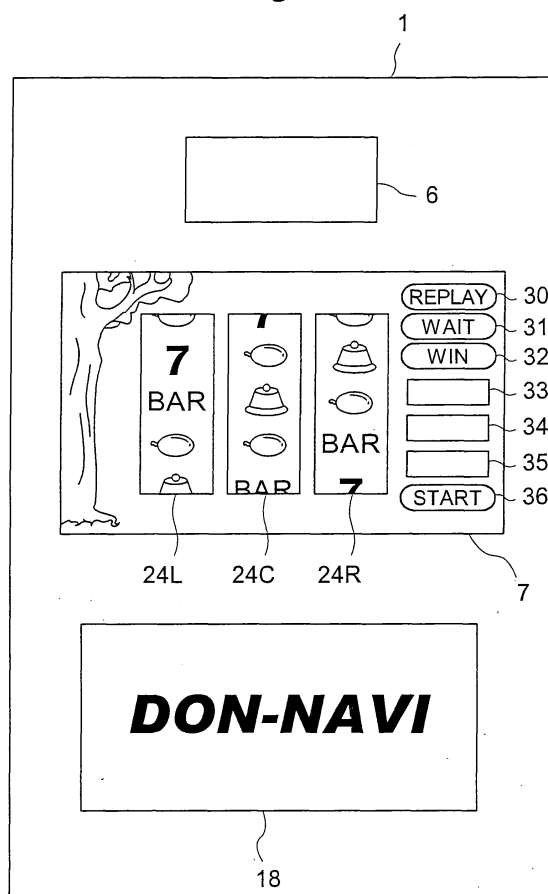
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(54) **Gaming machine**

(57) A gaming machine comprising a variable display device, a stop button for controlling the variable display device, and a lower display device is provided. The lower display device is provided below the stop button. The lower display device may show display contents, which can be modified. The variable display device of the gaming machine may be provided with a transparent acrylic plate serving as a protective cover, a liquid crystal display device, and a cold cathode tube serving as a backlight. The display contents include, for example, payout tables and characters.

Fig. 6



Description

FIELD OF THE INVENTION

[0001] The present invention relates to a symbol combination gaming machine, and more particularly, to a slot machine, a pachinko machine, or the like, which has variable display means for performing variable display of various kinds of symbols and a function of controlling the variable display so as to provide a player with advantages based on a result of the control.

RELATED ART

[0002] A slot machine may be a typical example of such gaming machines. The slot machine generally has a plurality of rotating reels, each of which have a plurality of symbols arranged around each circumferential surface thereof. When a combination of symbols appearing on respective front surfaces of the stopped reels matches a predetermined combination (for example, the same kind of symbols are lined up), the slot machine determines that the player has won with the symbol combination or that it is the winning symbol combination such that the slot machine pays out coins, gifts, or the like to the player. In general, many slot machines make use of various kinds of contingency so that the player cannot completely control the result of the game even if the player desires to win the game with his/her best techniques. Accordingly, the slot machine is mainly characterized with its gambling features.

[0003] To realize such contingency, various methods have been adopted. A control method called "pre-determination" is mainly employed. In the method, a micro-computer executes a winning lottery with software and performs control for stopping reels in accordance with a result of the lottery. For example, the slot machine described in Japanese Examined Patent Publication No. H03-72313 (JP-B-3-72313) relates to a slot machine with stop buttons (so-called pachi-slot) and includes random number sampling means for sampling a random number on the basis of a start lever operation by a player. The slot machine is provided with a winning probability table having columns respectively containing "big hit," "medium hit," and "small hit" random number ranges according to the ranks of respective winning combinations. If a sampled random number falls in any one of the winning random number ranges of the winning probability table, the slot machine determines that the corresponding winning combination is won, and sets a hit (winning) flag for the winning combination. There are various winning flags such as a winning flag for a winning combination called "small winning combination" and a winning flag for a winning combination called "bonus combination". The small winning combination causes payout of about ten coins to the player when predetermined symbols (for example, "bell" symbols or "cherry" symbols) are lined up on an activated pay line. The

bonus combination is generated when a predetermined kind of symbol (for example, "7" symbol or "BAR" symbol) appears on each reel so as to make a line of symbols of the same kind, and provides a game state which has higher possibility of winning than the normal game state during a predetermined number of games, whereby 100 to 400 coins may be paid out.

[0004] The state in which a winning flag is set is generally called a state of "internal winning" such that a combination of symbols corresponding any one of the winning combinations may line up along a pay line. An actual winning has not been established yet. In order to generate the actual winning, the player may need to perform a so-called "observation push", which should be made at the timing to cause respective desired symbols to line up along the pay line. The timing is generally at the moment a symbol faces the front within four precedent symbols from the desired symbol in the series of symbols drawn on the surface of each reel. Thus, each symbol in the series of symbols may be referred to as a frame. If such an operation is performed at a bad timing, so-called "unexpected loss" occurs, that is to say, no winning is established despite of the achieved internal winning.

[0005] The unexpected loss can be referred to as failure in the observation push on the whole, but the causes of the unexpected loss show several patterns. The first pattern is that a player fails to recognize each symbol on the surface of the moving reel and cannot perform a stop operation at a good timing although he/she has already chosen a target symbol. The second pattern is that the player fails to specify a target symbol the player should aim at when a plurality of kinds of winning combinations may cause the winning in a state of the internal winning such that the player cannot perform a stop operation at a good timing.

[0006] As to the first pattern, 'if the player becomes familiar with the observation push, the player can expect improvement in the timing accuracy to some extent. As to the second pattern, improvement in the timing accuracy of the observation push is not useful since the player needs to grasp an internal winning state, which is unrecognizable to his/her eyes.

[0007] In other words, if the slot machine is designed to notify the player of the internal winning combination, it is possible to realize such a game state as a bonus game state in which a large amount of coins may be paid out even during a normal game state. Further, a gaming machine having a function of so-called "Assist Time (AT)" is provided such that a gaming characteristic peculiar to the pachi-slot may be utilized so as to make the unexpected loss occur less frequently by notifying occurrence of the internal winning as well as the kind of the internal winning combination during a predetermined period, thereby decreasing the probability of the unexpected loss to realize payout of a large number of coins if compared to a normal gaming machine in which no notification is performed at all. The gaming state of

the above may be categorized in a "general game state", which is one of the "gaming states" to be described later, and can also be a gaming state that the actual amount of coins to be paid out becomes comparable to that in the bonus gaming state.

[0008] Similarly, a "Super Time (ST)" may be provided such that the amount of coins to be paid out may be varied by providing or not providing support to get the "winning" in an "internal winning state". In the ST, a plurality of "stop tables" are prepared which determine the number of frames to be slid after the stop operation is performed during rotation of each reel and before the corresponding reel stops. When the internal winning is obtained with a winning combination, one of the stop tables to be used is determined by random number lottery. If the player does not perform the stop operation in a predetermined order which is set on the determined stop table, the slot machine performs stop-control to disable the winning even if a stop button is pushed with the observation push at a good timing so that a desired symbol is supposed to appear on the surface facing the front to be aligned along the activated pay line. In the ST (or with the ST function), the player may be notified of the kind of the selected stop table or the player may not be notified of such information, thereby realizing a large number of coins to be paid out comparable to that in the bonus game, in a similar manner of the case of the above-described "AT".

[0009] For example, if the slot machine has three stop buttons for stopping a left reel, a center reel, and a right reel, respectively, six operation orders are prepared such as "left stop, center stop, right stop", "left stop, right stop, center stop", "right stop, left stop, center stop", "center stop, right stop, left stop" and "center stop, left stop, right stop". If the player does not operate in the operation order of a stop table determined by random number lottery, the winning shall not occur.

[0010] In an actual game, a special game state where the probability of the winning generation is rather high if compared to that in the above-described general game state and the general game state being different from the special game state are realized alternatively according to occasional game conditions. In either game state, it is required that a winning combination of symbols, which corresponds to the predetermined combination, are to be aligned along the pay line in order that coins are actually paid out to the player. In a general gaming machine, a plurality of winning modes (or combinations) with which the number of coins to be paid out ought to be determined, respectively. For example, small winning combinations such as a "cherry" winning combination and a "bell" winning combination and big bonus winning combinations such as a "big bonus" winning combination may be referred to.

[0011] Different numbers of coins to be paid out are set in advance with respective winning combinations, and a payout table having such numbers is displayed on a display panel so as to become visible to the player.

The display panel is composed of optically transparent cell sheets on which the winning symbols and the numbers of payout coins are drawn respectively and a transparent acrylic plate on which the optically transparent cell sheets are stacked. The symbols are illuminated with a light such as a fluorescent lamp from the inside of the gaming machine. A slot machine of a general type is provided with a plurality of display panels of the above-described type. The slot machine specifically includes a central display window, a reel display panel through which reels provided in the inside of the gaming machine are set visible to the player, an upper panel which is provided above the reel display panel and is made of a panel which is small in area if compared to the reel display panel, and a lower panel which is provided below the reel display panel so that the title of the pachislot and a character which is a symbol of the pachislot are depicted.

[0012] In a general type of pachislot, common front door and cabinet are utilized with the pachislot in terms of productive efficiency and cost, but the display panels of the pachislot have symbols drawn according to the planned game contents of its own such that the symbols may serve an indicia differentiating the pachislot from other gaming machines (referring to Japanese Unexamined Patent Application Publication No. H06-261972 (JP-A-6-261972)).

[0013] As a matter of course, different types of machines have different symbols drawn on their plurality of display panels, and for example, if the machines are left unsold, display panels thereof may not be utilized for another kind of machine because of the drawn symbols unlike other parts such as cabinets and front door bodies. Therefore, the unsold display panels may remain as dead stock. In addition, during the assembly of the machine, the step of attaching a display panel unit to a front door is so necessary that the number of manufacturing steps would not be decreased.

SUMMARY OF THE INVENTION

[0014] An object of the present invention is to reduce or eliminate such dead stock caused by manufacturing different display panels for respective different machines. It is another object of the present invention to reduce the number of assembling steps of display panels so as to provide a gaming machine having superior cost performance.

[0015] A gaming machine according to the present invention comprises variable display means for providing or performing a variable display of a plurality of symbols, lottery means for executing a lottery of a winning combination, and stop means for controlling the variable display means to stop the variable display based on a result of the lottery. The stop means includes a stop button operable by a player. The stop button is provided below the variable display means. A lower display means is provided below the stop button.

[0016] The variable display means may include an optically transmissive electronic display means, which may show images in a varying manner and include a variable display device. The variable display means may include a variable display device such as a reel with a plurality of symbols on the outer surface thereof and a liquid crystal display device. The variable display may be provided on the variable display device such as the liquid crystal display device with an appropriate control program. A rotating reel may show the variable display if the outer surface thereof is viewed from one direction such that a symbol on the outer surface in a front position is most clearly visible to the player. Therefore, the rotating reel and a window over the front outer surface of the reel display a plurality of symbols variably. The lottery means may include a lottery device such as a computer with a program generating a random number and detecting or storing such random number. The lottery device may also include a mechanical device comprising a gear, a shaft for the gear, and a rotation mechanism for the gear. The stop device may include a button, a lever, and any other operable switches. The lower display means may include a lower display device and a panel.

[0017] In the present invention, a lower display means, which may include a lower display device such as a panel display, is provided below the variable display means, which may include a reel display panel and a liquid crystal display device, is constituted of a lower display device to display various game information, such as a payout table, the symbol of a character, and a title logo. In the lower display device, a liquid crystal display, a CRT display, electroluminescence, a plasma display and the like may be utilized.

[0018] According to the above-described construction, it is possible to avoid disadvantages such as dead stock and increased assembly steps which may occur when a physical acrylic plate and a symbol cell sheet are used for the lower display panel, whereby it is possible to provide a gaming machine having superior cost performance.

[0019] In a second aspect according to the present invention, an optically transmissive electrical display device is provided in front of the variable display means.

[0020] In general, many types of reel display panels have a central display panel which is made of a transparent glass or acrylic plate so that rotating reels provided in the inside of a cabinet become visible. In the present invention, a transparent liquid crystal display device may be provided in front of the rotating reels to improve display effects. This liquid crystal display device displays various images according to variations in game status.

[0021] According to the above-described construction, although the reel display panel has heretofore been provided with still display symbols, various symbols can be displayed and controlled if it is necessary. In addition, since an optically transmissive liquid crystal display de-

vice may be utilized for the electrical display device, it is possible to provide a reel display panel which ensures the visibility of reel symbols.

[0022] According to the present invention, the gaming machine may also be provided with special game control means for generating a special game state advantageous to the player on the basis of a predetermined condition. The optically transmissive electrical display device is controlled for shielding an optical view through the device during the above-described special game state on the basis of the predetermined condition.

[0023] The optically transmissive liquid crystal display device may be controlled effectively to show effects, which include graphics, animation, and/or sound effect, in relation to a variable control of the reels when the game is controlled to shift into the special game state advantageous to the player. Thus, the effects may include one or more effect images. For example, in an effect showing method, only a reel to be stopped becomes visible by controlling the optically transmissive liquid crystal display device for making at least a part of the device transparent and the other reels become invisible by controlling the optically transmissive liquid crystal display device for shielding an optical view through at least a part of the device if the special game is in the ST for notifying a stop order advantageous to the player.

[0024] According to the above-described construction, when the player is to perform a stop operation during the game in the ST, the player can play the game in the ST without moving his/her eyes toward the respective reels from the electric display device which shows a stop order, whereby the player may suffer less fatigue. In addition, it is possible to switch back and forth instantaneously between controls for making the device transparent and for shielding an optical view through the device (or making the device opaque) in accordance with on-going game states and to control a shielding area with software so that more precise effect control may be made. The control of the optically transmissive liquid crystal display device may be made by a main and/or sub-control circuit for controlling the effects. It is usually required to obtain an internal winning state of a winning combination and/or game information about the stop states of the respective reels.

[0025] In another aspect of the present invention, a gaming machine comprising a variable display device and a stop button is provided such that the variable display device and the stop button are visible to and optionally operable by a player. The gaming machine may further comprise an optically transmissive electric display device displaying an effect image in the special game mode. The effect image in the special game mode may be determined by an operation order of one or more stop buttons.

[0026] Further features of the invention, its nature, and various advantages will be more apparent from the accompanying drawings and the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Fig. 1 is a perspective view of an external appearance of a pachislot according to an embodiment of the present invention.

Fig. 2 is a cross-sectional view of a front door and surroundings thereof.

Fig. 3 is a block diagram showing a main control circuit.

Fig. 4 is a block diagram showing a sub-control circuit.

Fig. 5 is a block diagram showing an image control circuit.

Fig. 6 shows each display panel (upper display panel, reel display panel, and lower display panel).

Fig. 7A shows an example of pay line.

Fig. 7B shows another example of pay lines.

Fig. 7C shows yet another example of pay lines.

Fig. 8 is a schematic front view of reels and back lamps.

Figs. 9A, 9B, and 9C show symbol arrays drawn on circumferential surfaces of left, center, and right reels, respectively.

Fig. 10 shows winning symbol combinations and the numbers of payout coins.

Fig. 11 shows a stop table to be selected in an internal winning state of a "bell" winning combination.

Fig. 12 shows a winning probability table.

Fig. 13 shows a list of commands to be transmitted to the sub-control circuit.

Figs. 14A, 14B and 14C are front views of a reel display panel with components.

Fig. 15 is a front view of the reel display panel in a shielded state.

Figs. 16A, 16B and 16C are front views of respective effect screens to be displayed during a game in ST.

Figs. 17A, 17B and 17C are front views of respective effect screens to be displayed during a game in ST.

Figs. 18A, 18B and 18C are front views of respective preview notice screens.

Figs. 19A and 19B are front views of D screens in respective preview notice screens.

Fig. 20 shows an preview effect generation table and an effect kind selection table.

Figs. 21A and 21 B show BR generation and BR continuation frequency lottery tables, respectively.

Figs. 22A and 22B show support menu and password input screens.

Fig. 23 shows a payout performance setting screen A.

Fig. 24 shows a payout performance setting screen B.

Fig. 25 shows a payout performance setting screen C.

Figs. 26A and 26B show payout tables.

Fig. 27 shows a flowchart of processing of the main control circuit.

Fig. 28 shows a flowchart of processing of the main control circuit.

Fig. 29 shows a flowchart of processing of the main control circuit.

Fig. 30 shows a flowchart of initializing process.

Fig. 31 shows a flowchart of interrupt process.

Fig. 32 shows a flowchart of main process of the sub-control circuit.

Fig. 33 shows a flowchart of parameter changing process.

Fig. 34 shows a flowchart of parameter changing process.

Fig. 35 shows a flowchart of payout/probability changing process.

Fig. 36 shows a flowchart of payout/probability changing process.

Fig. 37 shows a flowchart of input process.

Fig. 38 shows a flowchart of effect control process at start.

Fig. 39 shows a flowchart of BR generation lottery process.

Fig. 40 shows a flowchart of BR execution process.

Fig. 41 shows a flowchart of effect control process to be executed at reel stop.

Fig. 42 shows a flowchart of effect control process to be executed at end of one game.

Fig. 43 shows a flowchart of preview effect generation process.

Fig. 44 shows a flowchart of parameter updating process.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Fig. 1 is a perspective view of an external appearance of a slot machine having stop buttons (e.g., so-called pachislot), according to an embodiment of the present invention. A slot machine 1 has a front door 3 fixed in openable and closable conditions (e.g., hingedly) to a box-shaped cabinet 2 made of plywood. The upper portion of the front door 3 is provided with a game state display lamp 4 which lights or blinks in different modes in different occasions when a bonus game is generated and when an error is detected, speakers 5L and 5R which emit effect sounds, error sounds, and the like during the game, and an upper display panel 6 which displays the number of coins to be paid out on each winning combination as well as a brief explanation of game rules. A liquid crystal display device is provided in the inside of the upper display panel 6, and various data are displayed on the basis of payout data for various winning combinations that are stored in a ROM. A reel display panel 7 which is formed in an approximately vertical plane is provided in the central portion of the front door 3. [0029] A 1-BET switch 8, a 2-BET switch 9 and a MAX-BET switch 10 are provided around the bottom left

of the reel display panel 7. Presuming that the coins are credited, the 1-BET switch 8 allows a player to bet one coin on a game when the player depresses the 1-BET switch 8 once, the 2-BET switch 9 allows the player to bet two coins on a game when the player depresses the 2-BET switch 9 once, and the MAX-BET switch 10 allows the player to bet a maximum number of (e.g., three) coins on a game when the player depresses the MAX-BET switch 10 once. When the player operates any of these BET switches 8 to 10, one or more predetermined pay lines are activated. A coin insertion slot 11 through which coins are inserted is provided near the right lower part of the reel display panel 7.

[0030] A C/P (credit/payout) switch 12 which comprises a push button to be operated by the player in order to determine whether to credit or pay out the number of coins that the player has earned in the game is provided on the left side along a central and horizontal belt portion of the front door 3. By the switching of this C/P switch 12, the coins are paid out through a coin payout opening 17 provided in the lower portion of the front door 3, and the paid-out coins are deposited in a coin tray 16. A start lever 13 is provided for a tilting operation within a predetermined angular range on the right side of the C/P switch 12. When the start lever 13 is operated by the player, reels provided on the inside of the reel display panel 7 start rotating.

[0031] A stop control panel 14 for individually stopping a plurality of rotating reels is provided in the central portion of the front door 3 so as to constitute stop means. The stop control panel 14 is provided with a left stop button 15L, a center stop button 15C, and a right stop button 15R. The player can arbitrarily determine the order of operating these stop buttons 15L, 15C, and 15R. In general, a stop operation to be performed while all the reels are rotating is called a "first stop operation", the next stop operation to be performed is called a "second stop operation", and the last stop operation to be performed is called a "third stop operation". In this embodiment, to operate the left stop button 15L as the first stop operation is called "forward press", to operate the center stop button 15C as the first stop operation is called "center press", and to operate the right stop button 15R as the first stop operation is called "reverse press".

[0032] In the case of the gaming machine provided with such three stop buttons, there are a total of six kinds of stop operation orders: To operate the left stop button 15L as the first stop operation, the center stop button 15C as the second stop operation and the right stop button 15R as the third stop operation is called "left-center-right press"; to operate the center stop button 15C as the first stop operation, the left stop button 15L as the second stop operation and the right stop button 15R as the third stop operation is called "center-left-right press"; to operate the center stop button 15C as the first stop operation, the right stop button 15R as the second stop operation and the left stop button 15L as the third stop

operation is called "center-right-left press"; to operate the left stop button 15L as the first stop operation, the right stop button 15R as the second stop operation and the center stop button 15C as the third stop operation is called "left-right-center press"; to operate the right stop button 15R as the first stop operation, the left stop button 15L as the second stop operation and the center stop button 15C as the third stop operation is called "right-left-center press"; and to operate the right stop button 15R as the first stop operation, the center stop button 15C as the second stop operation and the left stop button 15L as the third stop operation is called "right-center-left press".

[0033] A lower display panel 18 which displays images such as the title of the slot machine 1 and the characters included in the game is provided below the stop control panel 14. A liquid crystal display device is provided on the inside of the lower display panel 18 so that various image effects are controlled on the basis of image data stored in a sub-control circuit to be described later.

[0034] Fig. 2 is a schematic cross-sectional view of the front door 3 and surroundings of the slot machine 1. The front door 3 is provided with three display panels arranged in the order from top to bottom, that is to say, the upper display panel 6, the reel display panel 7, and the lower display panel 18, and each of the display panels displays a title logo, characters, and effects relative to individual gaming situations. The reel display panel 7 includes a touch panel 28 for detecting a coordinate position touched by the player and a transparent acrylic cover 19 which serves as a protective cover, and further includes a picture sheet 20, and a reel liquid crystal display device 21 and an electronic shutter 22, all of which are stacked on the inside surface of the transparent acrylic cover 19. The picture sheet 20 has various pictures printed on its transparent film material, the reel liquid crystal display device 21 is a transparent liquid crystal display device using an ITO film or the like, and the electronic shutter 22 is made of a similar kind of liquid crystal film. Cold cathode tubes (CRTs) 23, each of which serve as a backlight for the reel liquid crystal display device 21 and an illumination device for illuminating symbols on the reels 24, are respectively provided at upper and lower positions on the inside of the reel display panel 7. The operations of these individual display elements are as follows. The symbols drawn on the picture sheet 20 are always visible to the player independently from the effect control state of the slot machine 1. The reel liquid crystal display device 21 serves as a display area for displaying image effects such as a jackpot effect (or big hit effect) and various preview effects. The electronic shutter 22 is capable of making an effect image shown on the reel liquid crystal display device 21 between in a normal display mode (in a state where only the effect image is visible since the electronic shutter 22 shields an optical view from the reels 24) and in a semi-transparent display mode (in a state where reel symbols

are visible through the device 21 since the electronic shutter 22 is open). Such alternating modes can be achieved by switching the reel display panel 7 back and forth between in transparent and opaque states so that the symbols on the reels 24 become visible through a predetermined area of the reel display panel 7 or blocked by the electronic shutter 22 in accordance with applied voltages to the electronic shutter 22.

[0035] The upper display panel 6 is provided above the reel display panel 7. The upper display panel 6 includes a transparent acrylic cover 19 which serves as a protective cover, and includes, on the inside of the transparent acrylic cover 19, an upper liquid crystal display device 26, cold cathode tubes 23 serving as a backlight source, and a light guiding plate 25 which directs light from the cold cathode tubes 23 toward the entire surface of the upper liquid crystal display device 26.

[0036] The lower display panel 18 is provided below the reel display panel 7. The lower display panel 18 includes a transparent acrylic cover 19 which serves as a protective cover, and includes, on the inside of the transparent acrylic cover 19, a lower liquid crystal display device 27, cold cathode tubes 23 serving as a backlight source, and a light guiding plate 25 which directs light from the cold cathode tubes 23 toward the entire surface of the lower liquid crystal display device 27.

[0037] Fig. 3 is one example of a circuit block diagram for realizing the operation of the slot machine 1 shown in Fig. 1. Game control means of this embodiment generally includes two control circuits: a main control circuit 101 and a sub-control circuit 201. Here, the game control means may also include a computer executable program. The main control circuit 101 controls electrically connected various peripheral devices on the basis of input signals from various detection means, while the sub-control circuit 201 controls, game information transmitted from the main control circuit 101 effect images to be displayed on various liquid crystal display devices, and effect sounds to be emitted from the speakers 5L and 5R, on the basis of operation inputs from the touch panel 28 provided in the reel display panel 7.

[0038] The main control circuit 101 includes as its main constituent element a microcomputer 102 disposed on a printed circuit board, and further includes a circuit for sampling a random number. The microcomputer 102 includes a ROM 104 in which game programs and data are stored in advance, a CPU 103 which performs control operations in accordance with the game programs stored in the ROM 104, and a RAM 105 which provides the work area necessary for control process.

[0039] Connected to the CPU 103 are a clock pulse generation circuit 106 for generating reference clock pulses, a frequency divider 107, a random number generator 108 for generating a random number to be sampled, and a sampling circuit 109 for sampling the random number on the basis of a signal from the start lever 13 which will be described later. The microcomputer 102 may also be utilized as random number sampling means

to perform sampling of a random number with software process. In this case, both the random number generator 108 and the sampling circuit 109 may be omitted.

[0040] The ROM 104 of the microcomputer 102 stores not only control programs for controlling various operations of the slot machine 1, but also various data such as a winning probability table used for determining in probability lottery process (which will be described later) whether a random number acquired on the basis of the operation of the start lever 13 is a winning value or a losing value, a stop table used for determining the stop positions of reels 24L, 24C, and 24R according to the operations of the respective stop buttons 15L, 15C, and 15R, and various game information commands to be supplied to the sub-control circuit 201.

[0041] The various peripheral devices (actuators) are also connected to the CPU 103 via an I/O port 110.

[0042] A motor driving circuit 111 performs driving control of stepping motors 112L, 112C, and 112R for rotationally driving the respective reels 24L, 24C, and 24R, in response to driving signals from the CPU 103. In addition, the motor driving circuit 111 performs stop-control of the stepping motors 112L, 112C, and 112R in response to stop control signals from the CPU 103.

[0043] A hopper driving circuit 113 performs driving control of a hopper 114 which is a coin payout device, on the basis of a payout command sent by the CPU 103.

[0044] A seven-segment driving circuit 122 performs driving control of various displays formed by seven segment LEDs (a during-bonus information display 33, a credit display 34, and a payout display 35).

[0045] A lamp driving circuit 116 performs lighting control of various displays formed by lamps (a REPLAY lamp 30, a WAIT lamp 31, a WIN lamp 32, and a START lamp 36).

[0046] Other effect display means comprises the reel liquid crystal display device 21, the electronic shutter 22; and the reel backlight. The effect display means is under driving control by the sub-control circuit 201.

[0047] Main input signal generation means for generating input signals necessary for the microcomputer 102 to generate control signals for the respective driving circuits are the start lever 13, the 1-BET switch 8, the 2-BET switch 9, the MAX-BET switch 10, the C/P switch 12, an inserted-coin sensor 117, a reel stop signal circuit 118, a reel index detection circuit 115, and a payout detection circuit 119. These circuits are also connected to the CPU 103 via the I/O port 110.

[0048] The start lever 13 detects a start operation by the player. The inserted-coin sensor 117 detects a coin which has passed through a selector for excluding deformed coins from among coins inserted from the coin insertion slot 11. The reel stop signal circuit 118 detects whether each of the stop buttons 15L, 15C, and 15R has been operated, and generates a stop signal. The reel index detection circuit 115 receives a signal from any of rotational reference position detection switches incorporated in the respective stepping motors 112L, 112C, and

112R, and supplies a symbol position reset signal to the CPU 103. The payout detection circuit 119 receives a signal from a coin detector 120 incorporated in the hopper 114, and supplies a number-of-payout-coins signal to the CPU 103.

[0049] The following description refers to how each of these driving circuits is controlled in the flow of a series of game processes. First of all, after the power source switch of the slot machine 1 has been turned on, the random number generator 108 continues to generate random numbers which belong to a predetermined numerical range. If the insertion of coins by the player is detected by the inserted-coin sensor 117 or the coins or equivalents are credited, the reel liquid crystal display device 21 displays an activated line corresponding to the number of betted coins in response to a bet operation of the 1-BET switch 8, the 2-BET switch 9, or the MAX-BET switch 10. The bet operation is as shown in the magnified view in Figs. 7A, 7B, and 7C. A one-bet operation makes a center line L1 an activated pay line (hereinafter abbreviated as an "activated line"), a two-bet operation makes, in addition to the center line L1, a top line L2A and a bottom line L2B activated lines, and a three-bet operation makes a cross or diagonal lines L3A and L3B activated lines in addition to the center line L1, the top line L2A, and the bottom line L2B.

[0050] Then, the sampling circuit 109 samples the random numbers at the timing when the start lever 13 detects the operation of the player to start a game. Then, the CPU 103 collates the sampled random number with the winning probability table stored in the ROM 104, and if the player hits a winning combination, the CPU 103 sets a winning flag corresponding to the winning combination. This software lottery process is hereinafter referred to as "probability lottery process", and the details thereof will be described later.

[0051] Then, the CPU 103 supplies driving pulses to each of the stepping motors 112L, 112C, and 112R through the motor driving circuit 111, whereby each of the reels 24L, 24C, and 24R starts rotating. The CPU 103 monitors the driving pulses that are being supplied, and updates a pulse counter reserved in the RAM 105. Then, the CPU 103 monitors the value of this pulse counter, and when the pulse counter reaches a predetermined value, the CPU 103 determines that each of the reels 24L, 24C, and 24R has moved by one symbol (also called one frame), and adds one to a symbol counter reserved in the RAM 105.

[0052] For example, if a reel using a stepping motor which makes one rotation with four hundred pulses has twenty-one symbols arranged on its circumferential surface, the reel moves by one symbol (or one frame) for a period of about nineteen pulses. When the value of the pulse counter reaches nineteen pulses, the CPU 103 determines that the reel has moved by one symbol, and adds one to the symbol counter.

[0053] In the meantime, when the reference point of each of the symbols of any of the reels 24L, 24C, and

24R passes through the center line L1 shown in Figs. 7A-C, the corresponding one of the reels 24L, 24C, and 24R generates an index detection signal, and a reset pulse is input to the CPU 103 via the reel index detection circuit 115. The CPU 103 which has detected the input of the reset pulse clears the symbol counter that has been incremented in the RAM 105, thereby ensuring matching between the position of a symbol grasped by software and the position of a symbol actually displayed.

[0054] After the reels 24L, 24C, and 24R have started rotating, when a predetermined period of time elapses such that the reels 24L, 24C, and 24R reach their constant-rotating speed, the operations of the respective stop buttons 15L, 15C, and 15R are activated. When the player performs a stop operation, a reel stop signal is input to the CPU 103 via the reel stop signal circuit 118 and software processing such as selection of a stop position is performed by the CPU 103. After that, a stop pulse is supplied to the corresponding one of the stepping motors 112L, 112C, and 112R via the motor driving circuit 111, whereby the corresponding one of the reels 24L, 24C, and 24R is controlled to come to a stop.

[0055] During the stop control of each of the reels 24L, 24C, and 24R, when the CPU 103 receives a stop signal from the reel stop signal circuit 118, the CPU 103 stores the code number of a symbol located on the center line L1 into a predetermined area of the RAM 105 as a stop operation position, and makes reference to the stop table on which stop operation positions are associated with symbols to be stopped and displayed on the center line L1. Then, the CPU 103 stores a symbol stop position corresponding to the stop operation position into a predetermined area of the RAM 105 and calculates how many pulses (or how many frames) remain to be supplied until an objective symbol can be stopped and displayed, and after having supplied the calculated number of pulses, the CPU 103 performs stop-control (i.e., control for stopping the reel as scheduled).

[0056] When all of the reels 24L, 24C, and 24R come to a stop, the CPU 103 performs winning retrieval. In the winning retrieval, first, the CPU 103 collates a symbol table stored in the ROM 104 with the symbol stop positions stored in the RAM 105 and grasps the stop state of the current game. The symbol table is constructed to correspond to the symbol arrays drawn on the circumferences of the respective reels 24L, 24C, and 24R. The symbol table includes code numbers indicative of the order of symbols from a reference position and symbol codes provided to correspond to the respective code numbers, and serves as a software reel band. Then, as to each of the activated lines L1, L2A, L2B, L3A, and L3B, the CPU 103 collates the stop state of the current game with a winning symbol combination table stored in the ROM 104, and determines whether the player has won. The winning symbol combination table is a table in which winning symbol combinations and the number of coins to be paid out for winning are stored in the state of corresponding to each other. In the case where acti-

vated winning symbol combinations and the number of payout coins are made different depending on individual game states, the CPU 103 performs such process by shifting these winning symbol combinations.

[0057] If the CPU 103 determines through the winning retrieval that the player has won, the CPU 103 supplies a payout signal to the hopper driving circuit 113 to pay out a predetermined number of coins from the hopper 114. At this time, the coin detector 120 counts the number of coins to be paid out from the hopper 114, and if the count of the coin detector 120 reaches a predetermined value, the coin detector 120 stops supplying the driving signal to the hopper driving circuit 113 so that the coin payout is stopped.

[0058] The block diagram of Fig. 4 represents the construction of the sub-control circuit 201. The sub-control circuit 201 controls the various liquid crystal display devices and peripheral devices responsible for effects, such as the speakers 5L and 5R, on the basis of game information from the main control circuit 101, and input signals from the touch panel 28.

[0059] This sub-control circuit 201 includes a sub-microcomputer 202 as its main constituent element, and further includes an upper display panel image control circuit 250, a reel display panel image control circuit 251, a lower display panel image control circuit 252, the control circuits 250, 251, and 252 performing driving control of the respective liquid crystal display devices 26, 21, and 27, a sound source IC 230 performing sound output control of the speakers 5L and 5R, a power amplifier 231 serving as an amplifier, a reel back lamp control circuit 240, and an electronic shutter control circuit 270 performing opening/closing control of the reel display panel section 7. These control circuits are formed on a printed circuit board separate from that of the main control circuit 101.

[0060] The sub-microcomputer 202 includes a sub-CPU 203, a sub-ROM 204 serving as storage means, and a sub-RAM 205. Although not shown in Fig. 5, similarly to the main control circuit 101, the sub-control circuit 201 is provided with a clock pulse generation circuit, a frequency divider, a random number generator, and a sampling circuit. The sub-ROM 204 stores a communications sequence program for enabling the sub-microcomputer 202 to communicate with the main control circuit 101, an effect selecting table from which the sub-microcomputer 202 is to select various effects on the basis of received game information, a sound sequence program and the like. The sub-RAM 205 is utilized as a work area by the sub-microcomputer 202 while the sub-microcomputer 202 is executing any of these control programs.

[0061] The sub-CPU 203 determines effects to be produced by individual effect control circuits, on the basis of a command transmitted from the main control circuit 101, and transmits determined contents to the respective effect control circuits.

[0062] The reel back lamp control circuit 240 is used

for effect display control to display winning effects and advance notice of a winning flag.

[0063] The electronic shutter control circuit 270 controls the opening and closing of the electronic shutter 22 disposed between the reel liquid crystal display device 21 and the reels 24L, 24C, and 24R, by determining whether to apply voltage to the electronic shutter 22. The electronic shutter control circuit 270 controls the electronic shutter 22 to close a necessary display area on the basis of contents determined by the sub-microcomputer 202, thereby closing an area which is specified to become invisible to the player (or opaque) on the inside of the reel liquid crystal display device 21. For example, a game in the ST which is a special game to notify the player of an appropriate stop order according to a selected stop table, when the player operates the start lever 13, the electronic shutter control circuit 270 performs the control of making visible only a reel to be operated during the first stop operation and covering the other reels, thereby causing the player to accurately recognize which reel is to be operated during the first stop operation.

[0064] The image control circuit of the slot machine 1 includes a plurality of control circuits for controlling the corresponding ones of the liquid crystal display devices provided in the respective display panels, that is to say, the upper display panel image control circuit 250, the reel display panel image control circuit 251 and the lower display panel image control circuit 252. Fig. 5 is a block diagram showing the reel display panel image control circuit 251 as one example of the image control circuit. The reel display panel image control circuit 251 performs display control of images to be displayed on the reel liquid crystal display device 21, and includes an image control CPU 253, an image control ROM 254, an image control RAM 255, an image ROM 257, a video RAM 258, and an image control IC 256. The image control CPU 253 receives a parameter determined by the sub-microcomputer 202, through an image control circuit IN port 259, and determines contents to be displayed on the reel liquid crystal display device 21, in accordance with an image control sequence program stored in the image control ROM 254. The image control ROM 254 stores programs such as a receipt sequence program for receiving image effect commands transmitted from the sub-microcomputer 202 and an image control sequence program for controlling the image control IC 256. The image control RAM 255 is used as a work area by the image control CPU 253 while the image control CPU 253 is executing any of these image control programs.

[0065] The image control IC 256 forms an image according to the display contents determined by the image control CPU 253, by making use of graphic data stored in the image ROM 257, and temporarily stores the image in the video RAM 258 and outputs the stored image to the reel liquid crystal display device 21 via an image control circuit OUT port 260 at an appropriate timing, there-

by producing a display effect.

[0066] Fig. 6 is a front elevational view of the slot machine 1, particularly showing the upper display panel 6, the reel display panel 7, and the lower display panel 18. In this embodiment, a liquid crystal display device is provided in any one of the display panels as a display device so that various images are displayed according to the status of a game and/or a sponsor of the game. The reel display panel 7 allows the symbols on the reels 24L, 24C, and 24R to become visible to the player through the reel liquid crystal display device 21 and the electronic shutter 22. When the reel liquid crystal display device 21 and the electronic shutter 22 are controlled to make the reel liquid crystal display device 21 transparent, the reel symbols become visible to the player, and when an image is displayed on the reel liquid crystal display device 21 or the electronic shutter 22 is controlled to be closed, i.e., become opaque (or the shutter 22 shields a view through the device 21), the reel symbols become invisible.

[0067] The lower display panel 18 is provided with the lower liquid crystal display device 27, and mainly displays the machine title of the slot machine 1 and a symbol based on the concept of the gaming machine. Fig. 6 shows the machine title "DON-NAVI". Display control of these images is performed on the basis of image data stored in the image ROM of the lower display panel image control circuit 252 of the sub-control circuit 201. Accordingly, merely by replacing the sub-control circuit 201 or the lower display panel image control circuit 252 with other control circuits, it is possible to easily manufacture various kinds of machines without the need to prepare different lower display panels for the respective kinds of machines nor to attach new lower display panels in a manufacturing process.

[0068] The upper display panel 6 is provided with the upper liquid crystal display device 26, and mainly displays a payout table. In this embodiment, the slot machine 1 is constructed so that the number of payout coins can be modified by a predetermined input operation, and the contents of the payout table are displayed in accordance with modified parameters. Details will be described later.

[0069] Fig. 8 is a magnified view of the reels 24L, 24C and 24R. Reel bands 40L, 40C, and 40R of the respective reels 24L, 24C and 24R are made of a semitransparent film material, and various symbols such as "cherry" symbols and "7" symbols are printed on a surface of each of the reel bands 40L, 40C, and 40R with an optically transmissive color ink, and the area except those symbols is masked with an optically non-transmissive ink. Lamp housings 41 L, 41 C, and 41 R are respectively disposed behind the reel bands 40L, 40C, and 40R so that the emission of one of reel back lamps does not interfere with other symbol areas. Reel back lamps 42L, 42C, and 42R are contained in the compartments of the lamp housings 41 L, 41 C, and 41 R, respectively. The reel back lamp control circuit 240 performs blinking con-

trol of the reel back lamps 42L, 42C, and 42R on the basis of parameters determined by the sub-microcomputer 202. For example, the reel back lamps 42L, 42C, and 42R opposed to symbols located on a pay line may be made to blink at the time of coin payout, or different blinking modes may be prepared for different internal winning combinations so that when a particular winning flag is set, the corresponding effect can be displayed to suggest which winning symbol the player should aim at.

[0070] Figs. 9A, 9B, and 9C are developed plan views of the reel bands 40L, 40C, and 40R, respectively. Each of the reel bands 40L, 40C and 40R is provided with twenty-one symbols, and the respective symbols are assigned symbol numbers 1 to 21 and are stored in the ROM 104 as the symbol table. Symbol arrays 40L', 40C', and 40R' are displayed while being moved in the order of the symbol numbers (from bottom to top) during the rotational driving of the respectively reels 24L, 24C, and 24R.

[0071] Fig. 10 is a view of the payout table showing the numbers of payout coins for winning symbol combinations (winning combinations) in each game state.

[0072] Internal winning, winning, and game states will be described below. The internal winning is a state in which, during the above-described probability lottery processing, a sampled random number is collated with the winning probability table so that the winning is determined and a winning flag of the corresponding winning combination is set.

[0073] Winning flags are basically assigned to all winning combinations, and are classified into two groups of winning combinations in terms of their characteristics. The first group includes winning combinations called small winning combinations, each of which allows a winning flag to be valid only in a game where the winning flag has been set, but does not allow the winning flag to be carried over into the next game and pays out a comparatively small number of coins. The second group includes winning combinations called bonus combinations, each of which allows a winning flag to be valid not only in a game where the winning flag has been set, but also to be carried over into a game where winning occurs and increases the internal lottery probability of a winning combination to pay out a large number of coins called a big bonus (BB) or a regular bonus (RB).

[0074] Examples of such small winning combinations are a "cherry" winning combination which allows the player to win whenever a particular symbol comes to a stop on an activated line of the left reel, as well as a "bell" winning combination and a "watermelon" winning combination either of which allows the player to win when three particular symbols come to a stop and are lined up on an activated line. Examples of the bonus combinations are a big bonus (BB) and a regular bonus (RB). The regular bonus (RB) occurs when, for example, three "BAR" symbols line up on an activated pay line in the form of "BAR-BAR-BAR", and first pays out fifteen coins. The player can play a one-coin-bet-bonus game

(called a "JAC game" or a "combination game") twelve times, or eight times until winning occurs. The big bonus (BB) occurs when, for example, three "red 7" symbols line up on an activated pay line in the form of "red 7-red 7-red 7", and first pays out fifteen coins. The player can play up to a maximum of thirty times the game called "BB-lasting general game," in which the winning probability of a small winning combination or an RB is increased, and can play an RB game during this period of time (while BB is lasting) up to a maximum of three times. The RB winning during a general game occurs when, for example, three "BAR" symbols line up in the form of "BAR-BAR-BAR", whereas RB winning during the BB-lasting general game occurs when three "replay" symbols line up in the form of "replay-replay-replay". If the player wins the replay winning combination, coins are automatically inserted by the same number as the number of coins inserted by the player, so that the player can play the next game without inserting coins. A single bonus (SB) occurs when, for example, three "sword 7" symbols line up on an activated pay line in the form of "sword 7-sword 7-sword 7", and first pays out fifteen coins. The player can play the JAC game once. This SB is entitled "bonus", but disallows the carry-over of the winning flag and allows the winning flag to be valid only in the current game, similarly to the small winning combinations.

[0075] Game states will be described below. The game states are classified into three state groups according to the presence or absence of a winning flag indicative of a bonus winning combination, that is to say, a general game state in which internal winning does not yet occur as to any bonus combination, a bonus internal winning state (also called a "bonus-internal-winning lasting period" or a "bonus-internal-hit lasting period") in which although internal winning has occurred in the probability lottery process, bonus winning symbols do not yet line up on an activated line, so that winning does not yet occur, and a bonus game state (also called a "bonus-activated period") in which the player successfully lines up winning symbols on an activated line during a bonus-internal-winning lasting period and plays a bonus game.

[0076] Furthermore, the bonus-internal-winning lasting period is divided into a BB-internal-winning lasting period and an RB-internal-winning lasting period according to the kind of bonuses. The bonus-activated period is also divided into a BB-activated period and an RB-activated period.

[0077] In addition to the bonus winning combinations, there exist game states which are advantageous to the player in that the player can get a large number of coins.

[0078] For example, a particular state called a "concentration function" is known. In this state, as probability tables of SB winning during the general game, there are prepared a high probability table (with an SB internal lottery probability of, for example, 1/2) and a low probability table (with an SB internal lottery probability of, for ex-

ample, 1/20). During the use of the low probability table, a lottery for switching the low probability table to the high probability table is carried out (generally called a "rush lottery"), whereas during the use of the high probability table, a lottery for switching the high probability table to the low probability table is carried out (generally called a "puncture lottery"), whereby the number of payout coins gradually increases during the use of the high probability table.

[0079] For example, a particular state called an "AT (assist time) function" is known. In this state, a plurality of winning combinations which do not at all occur at the same time are set (for example, there are provided winning combinations of "bell-bell-red 7", "bell-bell-blue 7" and "bell-bell-white 7", and an interval of four frames or more is provided between each of the "red 7", "blue 7" and "white 7" symbols on the right reel). In a normal state, since the player is not notified of the kind of internal winning combination, the player cannot know which of the "7s" he/she should aim at, and theoretically can only win with a probability of 1/3 after any internal lottery. In a state (called an "AT period") which notifies the player of the kind of internal lottery, the player can know the kind of "7" symbol which he/she should aim at, so that if the player accurately carries out even the observation push, the player can theoretically win with a probability of 100% after any internal winning combination, whereby the number of payout coins increases gradually.

[0080] There is also a state called a "ST (super time) function". In this state, if a predetermined stop order is not carried out on one internal winning combination, stop-control which disables the lining up of a winning combination of symbols is performed even if the winning combination gets the internal winning and the player performs an accurate observation push operation. As shown in Fig. 11, by way of example, as to the winning combinations "bell", six kinds of stop order tables are prepared from "No. 1" to "No. 6", and a stop table to be used is selected as by random number lottery when a "bell" symbol gets the internal winning in the probability lottery process. For example, in the case where the stop table "No. 3" is selected in the current game, the winning occurs when the center stop button 15C is operated as the first stop operation, the left stop button 15L as the second stop operation and the right stop button 15R as the third stop operation. The other five kinds of stop orders are each performed as a stop order which disables the lining up of "bell" symbols on an activated line even if a "bell" symbol gets the internal winning.

[0081] In the normal state, since the player is not notified of this stop order, the player theoretically can only win with a probability of 1/6 after the internal winning, but a particular state called a "ST period" is known. In the ST period, the player is notified of the kind of selected stop table, namely, the order of buttons to be stopped, so that the player can theoretically win with a probability of 100% after the internal winning and the number of payout coins increases gradually. In this em-

bodiment, even in the case of the same winning symbol combination, the number of payout coins is made different for different game states. For example, the "watermelon" winning combination pays out three coins during the general game as well as during the bonus-internal-winning lasting period, but pays out fifteen coins during the BB-lasting general game. The "replay-replay-replay" combination serves as a replay winning symbol combination during the general game and during the bonus-internal-winning lasting period, but becomes the RB winning symbol combination during the BB-lasting general game. In the JAC game, the "replay-replay-replay" combination becomes the bonus winning symbol combination which pays out fifteen coins.

[0082] In this embodiment, in addition to the bonus winning combinations, the above-described "ST function" is adopted as a state advantageous to the player, and the ST game (or the game in the ST) is activated when a predetermined condition is satisfied during the general game. Specifically, when the SB winning combination or the "bell" winning combination gets the internal winning, the player is notified of information about the stop order necessary to line up the winning symbols. Accordingly, when the SB winning combination or the "bell" winning combination gets the internal winning during the period of this special state, the player can positively generate winning without causing unexpected loss, by operating the stop buttons in accordance with the notified stop order. In this embodiment, on the basis of the payout table of Fig. 10, the number of coins to be paid out on the same winning combination can be modified by a predetermined input operation.

[0083] Fig. 12 shows the winning probability table used for the above-described probability lottery process. The random number is extracted from the range of "0" to "16383", and when the random number belongs to a winning range determined for any of the winning combinations, the corresponding winning combination is made an internal winning combination. For example, if the random number extracted in the current game is "10000", the random number belongs to the winning range of the "bell" winning combination: "2299" to "11024", so that the "bell" winning combination is made an internal winning combination. If the random number extracted in the current game is "15000", the random number belongs to the blank range of "13669" to "16383", so that none of the winning combinations becomes an internal winning combination and the random number is determined as a blank.

[0084] Fig. 13 shows a table of game information commands to be transmitted from the main control circuit 101. In this embodiment, the main control circuit 101 responsible for control of winning determination, coin payout and the like and the sub-control circuit 201 responsible for control of the reel liquid crystal display device 21 and the speakers 5L and 5R are mounted on separate boards. Both boards are connected to each other by a straight cable so that necessary information

is successively transmitted, because effect control to be processed by the sub-control circuit 201 needs the internal winning state of a winning combination processed by the main control circuit 101 and game information about the stop states of the respective reels. Commands to be transmitted from the main control circuit 101 include a "start command" which is transmitted when the start lever 13 is operated by the player, a "reel stop command" which is transmitted when any of the stop buttons 15L, 15C, and 15R is operated to stop the corresponding rotating one of the reels 24L, 24C, and 24R, "one-game end command" which is transmitted when one game comes to an end, "parameter change demand command" to execute parameter change process which enables the number of payout coins and an internal winning probability to be modified when the power source of the slot machine 1 is turned on, a "keyswitch-off command" which is transmitted when a keyswitch is turned off, and an "initialization command" to cause the liquid crystal display devices to display their initial images.

[0085] Figs. 14A to 14C are views showing various members which constitute the reel display panel 7. Fig. 14A is a front view of the reel display panel 7. The reel display panel 7 is a transparent acrylic plate to which the touch panel 28 is stuck, and serves as a protection cover against physical impact from the outside. Fig. 14B is a front view of the picture sheet 20. The picture sheet 20 has various symbols printed on a transparent film material with a semitransparent ink (or optically transmissive ink), and in this embodiment, a symbol of a tree is printed on the left side of the sheet 20. Fig. 14C is a front view of the electronic shutter 22. The electronic shutter 22 is made of liquid crystal film, and is switched between its transparent and opaque states according to the state of application of voltage to the electronic shutter 22. On the right side of the electronic shutter 22, a display area for displaying the lamp parts and the seven-segment display parts is held in a transparent state irrespective of the presence or absence of the state of application of voltage, whereby the display area is always visible to the player.

[0086] Fig. 15 is a magnified view of a display state in which the reel display panel 7 is to be placed when the entire area of the electronic shutter 22 is in a closed mode or an opaque state (when no voltage is applied to the electronic shutter 22). This display state occurs when, for example, the power source of the slot machine 1 is off, and the reels 24 are hidden by the electronic shutter 22 in the state of being invisible to or blocked from the player, whereas the picture sheet 20 is visible to the player without being influenced by the state of control of the electronic shutter 22, because the picture sheet 20 is provided in front of the electronic shutter 22 (on the side where the player stands). The various lamp displays and the seven-segment displays on the right side of the reel display panel 7 are disposed on the inside of the electronic shutter 22 in the cabinet of the slot machine 1, but are visible to the player because the cor-

responding display area of the electronic shutter 22 is always in a transparent state.

[0087] Figs. 16A to 16C are views showing effect screens appearing during the game in the ST which is a special game state (an effect of a special game mode). Fig. 16A is a view of one example of effect control during the ST game, showing an effect screen which is displayed on the reel display panel 7 before the first stop operation is performed in the case where a "bell" symbol gets the internal winning in the current game and the stop table No. 5 shown in Fig. 11 is selected. In this embodiment, in the effect control during the game in the ST, the electronic shutter 22 is placed under transparent control only in a display area in which a reel corresponding to a stop button to be operated is displayed, and is placed under opaque control (or shielding control) in the other display area, thereby suggesting an appropriate stop operation. Since the stop table No. 5 indicates the right stop button 15R for the first stop operation, the electronic shutter 22 is made opaque in the display area of the reel display panel 7 except an area for display of the right reel 24R so that only the rotating right reel 24R is visible to the player, thereby suggesting to the player that he/she operate the right stop button 15R. The transparent control is to control the electronic shutter 22 to allow the reel symbols disposed behind the electronic shutter 22 to become visible, and as long as the reel symbols are visible to the player, the electronic shutter 22 may also be placed into not a completely transparent state but a semitransparent state, or into a colored state. Similarly, the opaque state of the electronic shutter 22 includes not only a state which completely blocks light, but also a somewhat semitransparent state which does not allow the reel symbols behind to become visible.

[0088] Fig. 16B is a view showing an effect screen which is displayed on the reel display panel 7 when the player operates the right stop button 15R during the state shown in Fig. 16A. Since the first stop operation of the right stop button 15R is a correct stop operation, the area for display of the right reel 24R in which the rotating right reel 15R is in whole visible in Fig. 16A is set to make only a "bell" symbol of an internal winning combination visible to the player, while the other display area of the reel display panel 7 is opaquely covered by the electronic shutter 22, thereby notifying the player that the first stop operation of the right stop button 15R has been a correct stop operation. In addition, an area for display of the left reel 24L that has been opaquely covered by the electronic shutter 22 in Fig. 16A is placed in a transparent state where the rotating left reel 24L is visible, thereby suggesting to the player that he/she operate the left reel 24L.

[0089] Fig. 16C is a view showing an effect screen which is displayed on the reel display panel 7 when the player operates the left stop button 15L during the state shown in Fig. 16B. Since the second stop operation of the left stop button 15L is a correct stop operation, the area for display of the left reel 24L in which the rotating

left reel 15L is in whole visible in Fig. 16B is set to make only a "bell" symbol of the internal winning combination visible to the player, while the other display area of the reel display panel 7 is opaquely shielded by the electronic shutter 22, thereby notifying the player that the second stop operation of the left stop button 15L has been a correct stop operation. In addition, an area for display of the center reel 24C that has been opaquely covered by the electronic shutter 22 in Fig. 16B is placed in a transparent state where the rotating center reel 24C is visible, thereby suggesting to the player that he/she operate the remaining center reel 24L.

[0090] Fig. 17A is a view of an effect screen which is displayed on the reel display panel 7 when all the stop operations during the game in the ST are correctly performed to generate the winning. In Fig. 17A, the electronic shutter 22 is placed under transparent control only in portions corresponding to the "bell" symbols of the winning combination, whereby the "bell" symbols on the reels 24 are visible, while the letters "GET" are displayed on the reel liquid crystal display device 21 to notify the player that the "bell" symbols have won.

[0091] Fig. 17B is a view of an effect screen which is displayed on the reel display panel 7 when a stop operation during the game in the ST is erroneously performed to generate unexpected loss. For example, during the state shown in Fig. 16B, when the player erroneously operates the center stop button 15C instead of the left stop button 15L, the symbol "×" is displayed on a magnified scale in the center of the display to notify the player that he/she has performed an erroneous stop operation.

[0092] After the effect control executed as shown in each of Figs. 17A and 17B has displayed the effect screen for a predetermined time, all the opaque areas of the electronic shutter 22 are placed under transparent control as shown in Fig. 16C, so that the effect control in one game comes to an end.

[0093] Figs. 18A to 18C are views showing a preview notice effect screen which is generated with a predetermined probability after all of the reels 24L, 24C, and 24R have stopped. The flow of a specific effect is as follows. First, the rotating reels 24L, 24C, and 24R are displayed behind the reel display panel 7 (Fig. 18A). After that, all of the reels 24L, 24C, and 24R are stopped by the stop operation of the player (Fig. 18B). After all of the reels 24L, 24C, and 24R have come to a stop, the electronic shutter 22 is made in the opaque state, and the reels 24L, 24C, and 24R which have been displayed are hidden behind the electronic shutter 22 as shown in Fig. 18C.

[0094] Then, a preview notice effect based on the internal winning combination in the current game is executed. The preview notice effect of this embodiment adopts a method of representing the reliability of establishment of each of the bonus winning combinations by determining to what extent the display positions of "bell" symbols displayed on the reel liquid crystal display de-

vice 21 coincide with the stop positions of "bell" symbols of the reels 24L, 24C, and 24R which are displayed in stopped states. Fig. 21A shows a preview notice effect generation table. The preview notice effect generation table is referred to by the CPU 103 when the CPU 103 is to execute a lottery as to whether to execute the preview notice effect, in the case where any of the BB, RB, watermelon, and SB winning combinations gets the internal winning in the probability lottery process. For example, in the case where a "watermelon" symbol gets internal winning and an effect-selecting random number is "15" in the current game, the corresponding advance notice effect is generated, but in the case where the current internal winning combination is an "SB" winning combination, no preview notice effect is generated, even if the effect-selecting random number is the same as "15".

[0095] Fig. 21 B shows an effect type selection table. The effect type selection table is referred to by the CPU 103 when the CPU 103 is to determine the contents of an effect, in the case where generation of a preview notice effect is determined through the preview notice effect generation table. The preview notice effect is divided into effect types on the basis of the accuracy with which the "bell" symbol stop positions on the reels 24L, 24C, and 24R are made to coincide with the "bell" symbol stop positions displayed on the reel liquid crystal display device 21, and as the accuracy of coincidence becomes higher, the probability with which a bonus winning combination gets internal winning becomes higher. For example, in the column of "bell display number" shown in Fig. 21 B, "all" signifies that all the "bell" symbol display positions of both the reels 24L, 24C, and 24R, and the reel liquid crystal display device 21 are coincident with one another, and "appearance number-2" signifies that the "bell" symbol display positions of both are uncoincident at a maximum of two locations. For example, in the current game, if the internal winning combination is "SB" and the effect-selecting random number is "118", an effect corresponding to "appearance number-4" is selected. If, for example, only two "bell" symbols are displayed on the reels 24L, 24C, and 24R in a stopped state, an effect mode which causes all the "bell" symbol display positions to be uncoincident is selected, while if, for example, five "bell" symbols are displayed, four "bell" symbol display positions are displayed in an uncoincident state and one "bell" symbol display position is displayed in a coincident state.

[0096] Figs. 19A and 19B are views showing specific examples of preview notice effect modes. The example shown in Fig. 19A is displayed when any number of "appearance number-2", "appearance number-3", "appearance number-4" or "appearance number-5" is selected from the effect-type selection table shown in Fig. 21 B with the reels 24L, 24C, and 24R stopped in the display mode shown in Fig. 18B. In the reel stop mode shown in Fig. 18B, "bell" symbols are respectively displayed in the center section of the center reel 24c and in the top

section of the right reel 24R among the reels 24L, 24C, and 24R, but on the reel liquid crystal display device 21, "bell" symbols are respectively displayed in the center-reel bottom section and in the right-reel center section. Since the "bell" symbol display positions do not coincide between both, the player can judge that a preview notice effect of low reliability has been displayed.

[0097] The example shown in Fig. 19B is displayed when any number of "appearance number-1" is selected from the effect-type selection table shown in Fig. 21 B with the reels 24L, 24C and 24R stopped in the display mode shown in Fig. 18B. Among the reels 24L, 24C, and 24R, "bell" symbols are respectively displayed in the center section of the center reel 24C and in the top section of the right reel 24R, while on the reel liquid crystal display device 21, "bell" symbols are respectively displayed in the center-reel center section and in the right-reel center section. The "bell" symbol display position on the right reel 24R does not coincide, but the "bell" symbol display position on the center reel 24C coincides, whereby the player can judge that an advance notice effect of high reliability has been displayed.

[0098] Fig. 20 is a view showing a BR generation and BR continuation period lottery table. Here, BR stands for battle rush, which is one of the special game states. In this embodiment, whether to generate a BR, and a BR continuation frequency, are determined by executing a lottery with a predetermined probability in the case where a predetermined winning combination has got internal winning. According to the table, the BR is generated with a probability of 16/128 at the time of "watermelon" internal winning, with a probability of 11/128 at the time of two-cherry internal winning, or with a probability of 25/128 at the time of a blank combination.

[0099] Figs. 22A and 22B shows a support menu which permits a parlor clerk to modify and select the payout performance of the slot machine 1. A support menu screen is displayed when the keyswitch (not shown) provided in a power source box inside the slot machine 1 is turned on and the power source of the slot machine 1 is activated. The support menu includes three modes. Mode 1 is a mode for making modification of the number of payout coins for each winning combination and modification of the internal winning probability of each winning combination, and permits the parlor clerk to select arbitrary performance on a payout performance setting screen which will be described later. Mode 2 is a mode for making modification of the number of payout coins for each winning combination and the generation probability of the ST game. Mode 3 is a mode for making setting in six steps. The parlor clerk can select each of the modes by touching the corresponding display area, and when the parlor clerk selects "end" after the completion of setting, the slot machine 1 returns to its normal game state.

[0100] Fig. 22B is shows a password input screen which is displayed when Mode 1 is selected. Mode 1 is a mode for modifying the payout performance of the slot

machine 1 by modifying the internal winning probability of each winning combination and the number of payout coins on each winning combination. Since variations in the payout performance directly relate to the business of pachinko parlors, high security is necessary, so that Mode 1 requests the parlor clerk to input a password before allowing the parlor clerk to proceed to a setting screen. The parlor clerk inputs a specified password through alphabet input means using the touch panel 28 which is displayed in the central portion of the screen on the bottom side thereof. After having input the password, when the parlor clerk inputs an "end" command on the alphabet input means, the slot machine 1 performs collation of the password, and if the password is a correct input, the parlor clerk is allowed to proceed to the setting screen. If the parlor clerk is to complete the current input work, the parlor clerk returns to the support menu screen by selecting "return".

[0101] Figs. 23 to 25 are views showing payout performance setting screens. In this embodiment, a plurality of payout performance setting screens are prepared, and the payout performance setting screens differ from each other in the number of payout coins for each winning combination and in the internal winning probability of each winning combination. Fig. 23 is a view showing a payout performance setting screen A which is displayed after a password has been input on the password input screen. The setting screen A can be used to set standard payout performance. The number of payout coins and the internal winning probability for the general game state and those for the BB-lasting general game state are set with respect to each of the winning symbol combinations listed on the left side of the screen. For example, during the general game state, the "watermelon" symbol has an internal winning probability of 141/16384, and the number of coins to be paid out on the "watermelon" winning combination is three. At the top center of the setting screen A, a screen switching icon is displayed, and when the parlor clerk touches the icon, the setting screen A is switched to the next screen. If the parlor clerk desires to use the setting screen A, the parlor clerk touches a "determination" icon at the bottom left of the setting screen A to decide to use the setting screen A, and returns to the support menu screen shown in Fig. 22A.

[0102] Fig. 24 is a view showing a payout performance setting screen B. The setting screen B is intended to enable the player to enjoy the general game without losing coins in a short time, by increasing the number of payout coins and the internal winning probability of each small winning combination during the general game state (the internal winning probability and the number of payout coins for the "watermelon" winning combination during the general game state are respectively increased to 356/16384 and 15, and the internal winning probability and the number of payout coins for the "bell" winning combination during the general game state are respectively increased to 7688/16384 and 6). Contrarily,

the internal winning probability of the BB winning combination is set to 38/16384 so that the total payout rate converges to a constant value.

[0103] Fig. 25 is a view showing a payout performance setting screen C. The setting screen C is intended to enable the player to enjoy the general game without losing coins in a short time, by increasing the internal winning probability of the "bell" winning combination during the general game. Contrarily, the number of times by which the player can try the RB game during the BB is decreased from three to two so that the total payout rate converges to a constant value.

[0104] In this manner, the parlor clerk can modify the game characteristics of the slot machine 1 by selecting any of the plurality of kinds of payout performance setting screens prepared in advance. Furthermore, the slot machine 1 may also be constructed so that each data value of any of the payout performance setting screens can be modified to enable fine adjustment of the game characteristics.

[0105] Figs. 26A and 26B are views showing payout tables to be displayed on the upper display panel 6. In this embodiment, as described above, the slot machine 1 is constructed so that the number of payout coins and the internal winning probability of each winning combination can be varied, and performs control to display a payout table according to the parameters set by the parlor clerk. Fig. 26A is a view showing a payout table to be displayed when setting is performed with the contents of the payout performance setting screen A shown in Fig. 23.

[0106] Fig. 26B is a view showing a payout table to be displayed when setting is performed with the contents of the payout performance setting screen B shown in Fig. 24. As compared with the payout table shown in Fig. 26A, in the payout table shown in Fig. 26A, the number of coins to be paid out on the "watermelon" winning combination during the general game is changed from three to fifteen, and the number of coins to be paid out on the "cherry" winning combination during the general game is changed from one to two.

[0107] The control operations of the main control circuit 101 and the CPU 103 will be described below with reference to the main process shown in Figs. 27 to 29.

[0108] First, the CPU 103 performs initializing process prior to the start of the game (Step 501, which will be hereinafter abbreviated as "S501."). The initializing process activates the above-described support menu screen and executes modification of the number of payout coins and an internal winning probability before the operation of the slot machine 1. Details will be described later.

[0109] Then, the CPU 103 determines whether there is a request for automatic insertion of coins, that is to say, whether a player won a "replay" winning combination in the previous game (S502). If the answer is "YES", the CPU 103 performs automatic insertion of the requested number of coins (S503), and proceeds to the

process of (S505). If the answer to the question of S502 is "NO", the CPU 103 determines (S504) whether a coin has been newly inserted, that is to say, whether there is an input from the inserted-coin sensor 117 which indicates that the player has inserted a coin into the coin insertion slot 11, or there is an input which indicates that any of the BET switches 8, 9, and 10 has been operated. If the answer is "YES", the CPU 103 proceeds to S505, whereas if the answer is "NO", the CPU 103 continues to monitor input signals until the BET operation is performed.

[0110] Then, the CPU 103 determines whether there is an input provided by the operation of the start lever 13 (S505). If the answer is "YES", the CPU 103 proceeds to S506, whereas if the answer is "NO", the CPU 103 continues to monitor input signals until the start lever 13 is operated.

[0111] Then, the CPU 103 performs probability lottery process (S506). In the probability lottery process, first, the CPU 103 extracts a random number for a lottery from the range of "0" to "16383" by using the random number generator 108 and the sampling circuit 109. Then, the CPU 103 determines, by using the winning probability table (Fig. 12) in which winning random number ranges (or winning ranges) are set according to game states and the number of inserted coins, which of the winning ranges the extracted random number belongs to, and determines the corresponding internal winning combination (or winning flag).

[0112] Then, the CPU 103 executes WIN lamp lighting process (S507). The WIN lamp lighting process is a process for determining, when any of the bonus winning combinations gets the internal winning, whether the WIN lamp 32 which emits light with a constant probability is to be turned on, and causing a result of the process.

[0113] Then, the CPU 103 transmits to the sub-control circuit 201 the game information of the main control circuit 101 at the time of the start of the game (S508). Commands to be transmitted include, as shown in the "start command" column of the game information commands shown in Fig. 12, the winning flag determined in the above-described probability lottery process, the current game state, a stop table number determined according to the winning flag, and the like.

[0114] Then, the CPU 103 determines whether a one-game monitor timer which has been set in the previous game has counted for a specified time, for example, 4.1 seconds (S509). If the answer is "YES", the CPU 103 sets a one-game monitor timer for the next game (S511), whereas if the answer is "NO", the CPU 103 waits for the remaining specified time (S510), and then sets a one-game monitor timer for the next game (S511).

[0115] Then, the CPU 103 controls the motor driving circuit 111 and performs the process of rotating the reels 24L, 24C, and 24R (reel rotation process) (S512). The reel rotation process performs the process of accelerating the reels 24L, 24C, and 24R which have been stopped, and after the reels 24L, 24C, and 24R have

reached a constant speed, performs the process of rotating the reels 24L, 24C, and 24R at the constant speed. On condition that the reels 24L, 24C, and 24R has been reached at their constant-rotating speed, the CPU 103 activates the stop buttons 15L, 15C, and 15R to enable the operation of stopping the reels 24L, 24C, and 24R.

[0116] Then, the CPU 103 determines whether any of the stop buttons 15L, 15C, and 15R has been operated (turned on), that is to say, the presence or absence of a stop signal to be transmitted from the reel stop signal circuit 118 when any of the stop buttons 15L, 15C, and 15R has been operated by the player (S513). If the answer is "YES", the CPU 103 proceeds to S515, whereas if the answer is "NO", the CPU 103 proceeds to the process of S514. In the process of S514, the CPU 103 determines whether the value of an automatic stop timer is "0". The automatic stop is the process of automatically performing control for stopping the reels 24L, 24C, and 24R when a predetermined time (for example, 40 seconds) passes after the start of the rotation of the reels 24L, 24C, and 24R, even if the stop buttons 15L, 15C, or 15R is not yet operated and the reels 24L, 24C, and 24R are still rotating. If the answer to this decision is "YES", that is to say, the value of the automatic stop timer is "0", the CPU 103 proceeds to S515 in order to automatically stop the reels 24L, 24C, and 24R, whereas if the answer is "NO", the CPU 103 proceeds to the process of S513 in order to continue to monitor the acceptance of stop operations.

[0117] In the process of S515, the CPU 103 performs "number-of-sliding-frames determining process". In the "number-of-sliding-frames determining process", the CPU 103 determines the number of sliding frames for the one of the reels 24L, 24C, and 24R which corresponds to respectively operated stop buttons 15L, 15C, and 15R. The term "number of sliding frames" means the number of symbols (or frames) by which each of the reels 24L, 24C, and 24R, before it comes to a stop, is to be slid from a symbol position (referred to as a "stop operation position") which is displayed in the corresponding one of display windows 43L, 43C, and 43R when the corresponding one of the stop buttons 15L, 15C, and 15R is operated (a position where each of the reels 24L, 24C, and 24R actually comes to a stop is referred to as a "stop position").

[0118] Then, the CPU 103 controls the motor driving circuit 111 so that the reel corresponding to the operated stop button comes to a stop after having rotated by the determined number of sliding frames (S516).

[0119] The CPU 103 transmits to the sub-control circuit 201 a "reel stop command" indicating that the reel has come to a stop (S517). As shown in the "reel stop command" column of the game information commands shown in Fig. 13, the reel stop command transmits to the sub-control circuit 201 a stop order status (which order does the current stop operation belong to?) and a stop reel status (which reel has been operated and

stopped?).

[0120] Then, the CPU 103 determines whether all of the reels 24L, 24C, and 24R have stopped. If the answer is "YES", the CPU 103 proceeds to S519, whereas if the answer is "NO", this indicates that there remains a rotating reel, and the CPU 103 proceeds to S513.

[0121] Then, the CPU 103 performs the winning retrieval process (S519). In the winning retrieval process, the CPU 103 determines whether the stop mode of the symbols indicates a valid winning, and if the stop mode indicates the valid winning, the CPU 103 stores a winning flag indicative of the corresponding winning combination in the RAM 105. Specifically, the CPU 103 makes such determination by collating the code number of a symbol located on the center line L1 with the winning symbol combination table stored in the ROM 104.

[0122] Then, the CPU 103 collates the winning flag with a lucky flag and determines whether the current winning is normal (S520). If the answer is "NO", the CPU 103 provides display of illegal error and cancels the execution of the game program. If the answer to the decision of S520 is "YES", the CPU 103 performs payout of the number of coins that corresponds to the type of the valid winning combination and the game state (S522).

[0123] Then, if the game state is to change after the current game comes to an end, the CPU 103 performs the corresponding transition process (S523) for updating the game situation. The transition process is performed, for example, in cases where the last winning of a bonus game occurs, where a bonus of the current game gets the internal winning, and where symbols such as "7-7-7" stop on the activated line and a bonus game starts.

[0124] Then, the CPU 103 transmits the type of the valid winning combination, the game state and the like to the sub-control circuit 201 as "one-game end commands" which are shown in the game information command table of Fig. 13 (S524).

[0125] Fig. 30 is a flowchart showing the initializing process. First, the CPU 103 clears all the data in the RAM 105 (S530), and determines whether the keyswitch is on (S531). The keyswitch is a switch for selecting whether to execute parameter change process for making modification of the number of payout coins and modification of an internal winning probability. If the power source is activated with the keyswitch on, the CPU 103 allows the parameter change process to be executed by the sub-control circuit 201, whereas if the power source is activated with the keyswitch off, the CPU 103 does not allow the execution of the parameter change process, and performs initialization for starting the game. Accordingly, if the answer to the process of S531 is "YES", the CPU 103 transmits a parameter update demand command to the sub-control circuit 201 to cause it to execute the parameter change process (S532). Then, the CPU 103 determines whether the keyswitch has been turned off (S533), and if the answer is "NO", the CPU 103 transmits an initialization command

(S537), and returns to the main process. If the answer is "YES", the CPU 103 transmits a keyswitch-off command to the sub-control circuit 201 to cause it to end the parameter change process (S534), whereas if the answer is "NO", the CPU 103 skips S534. Then, the CPU 103 determines whether a parameter change completion command indicating that the parameter change process by the sub-control circuit 201 has come to an end has been received (S535). If the answer is "YES", the CPU 103 executes rewrite process as to the number of payout coins or a winning probability on the basis of the contents of the received command (S536), and transmits an initializing command (S537) and returns to the main flow. If the answer is "NO", this indicates that the sub-control circuit 201 is still updating, so that the CPU 103 monitors the state of reception of the command in S535.

[0126] The control operation of the sub-CPU 203 of the sub-control circuit 201 will be described below.

[0127] Fig. 31 is a flowchart showing interrupt process. The interrupt process is executed as interrupt process every three microseconds by the sub-CPU 203, and the sub-CPU 203 stores a command transmitted from the main control circuit 101 into the sub-RAM 205.

[0128] First, the sub-CPU 203 checks an input buffer (S600), and determines whether the input buffer has an input signal (S601). If the answer is "NO", the sub-CPU 203 directly ends the interrupt process. If the answer is "YES", the sub-CPU 203 turns on a reception flag (S602) and sets the contents of the received command to the sub-RAM 205 (S603), and brings the interrupt process to an end. Then, the sub-CPU 203 checks the received command and determines whether the received command is an initialization command (S604). If the answer is "YES", the sub-CPU 203 checks applied payout performance settings and image data based thereon (S605) and causes the respective liquid crystal display devices to display images (S606), and brings the interrupt process to an end. If the answer is "NO", the sub-CPU 203 directly brings the interrupt process to an end.

[0129] Fig. 32 is a flowchart showing the main process of the sub-control circuit 201. First, the sub-CPU 203 checks the reception flag of the sub-RAM 205, and determines whether a parameter change demand command has been transmitted from the main control circuit 101 (S620), and if the answer is "YES", the sub-CPU 203 executes parameter change process (S621) and proceeds to S622. If the answer is "NO", the sub-CPU 203 skips S621. The parameter change process can modify the number of payout coins and a winning probability. Details will be described later.

[0130] Then, the sub-CPU 203 determines whether the sub-control circuit 201 has received a start command (S622), and if the answer is "NO", the sub-CPU 203 skips S623 to S624, whereas if the answer is "YES", the sub-CPU 203 executes effect control process for the starting period of the main process (S622). The effect

control process for the starting period performs BR control process in the case where an RB is occurring. Details will be described later.

[0131] Then, the sub-CPU 203 determines whether the sub-control circuit 201 has received a reel stop command (S624), and if the answer is "NO", the sub-CPU 203 skips S625 to S626, whereas if the answer is "YES", the sub-CPU 203 executes effect control process for a reel stopping period (S625). The effect control process for a reel stopping period notifies the player of stop order during BR generation lottery process or a BR, and provides an effect corresponding to the degree of matching between notified contents and an actual stop operation. Details will be described later.

[0132] Then, the sub-CPU 203 determines whether the sub-control circuit 201 has received a one-game end command (S626), and if the answer is "NO", the sub-CPU 203 skips S627 and returns to the process of S620, and repeatedly performs the same process. If the answer is "YES", the sub-CPU 203 executes effect control process for a one-game end period (S627). The effect control process for a one-game end period executes preview notice effect process, and updating process on a BR continuation period in the case where a BR is occurring. Details will be described later.

[0133] After the S627 has come to an end, the sub-CPU 203 returns to S620 and repeatedly performs the same process. In this manner, on the basis of each of the commands transmitted from the main control circuit 101, the main process of the sub-control circuit 201 repeatedly performs a process which branches to the corresponding effect process.

[0134] Fig. 33 is a flowchart showing the parameter change process. First, the CPU 103 displays the support menu screen shown in Fig. 22A (S540). The support menu makes it possible to select any one from the three modes. The sub-CPU 203 determines whether Mode 1 has been selected (S541), and if the answer is "YES", the sub-CPU 203 executes payout/probability modifying process (S542) and proceeds to S547. If the answer is "NO", then the sub-CPU 203 determines whether Mode 2 has been selected (S543). If the answer is "YES", the sub-CPU 203 executes ST generation probability modifying process (S544), and proceeds to S547. If the answer is "NO", then the sub-CPU 203 determines whether Mode 3 has been selected (S545), and if the answer is "YES", the sub-CPU 203 executes setting modifying process and proceeds to S547. If the answer is "NO", the sub-CPU 203 does not execute any of the modes, and proceeds to S547.

[0135] Then, the sub-CPU 203 determines whether the keyswitch has been turned off, namely, whether the sub-control circuit 201 has received a keyswitch-off command transmitted from the main control circuit 101 (S547). If the answer is "YES", the sub-CPU 203 transmits the current stored number-of-payout-coins data and probability data to the main control circuit 101 as a parameter change completion command (S548), and

brings the support menu to an end and returns to the initializing process. If the answer is "NO", the sub-CPU 203 returns to S540, and repeats the same process until an input to select any of the modes or an input to operate the keyswitch has been provided.

[0136] Fig. 35 is a flowchart showing the payout/probability modifying process. First, the CPU 103 displays the password input screen shown in Fig. 22B (S550). Then, the CPU 103 determines whether character inputs have been provided through a pseudo-keyboard displayed on the screen (S551), and if the answer is "YES", the CPU 103 displays the input characters in the input character display shown in Fig. 22B (the input letters are displayed in an asterisk form) (S552), and returns to S551. If the answer is "NO", then the CPU 103 determines whether the key "correction" displayed at the bottom right of the pseudo-keyboard has been operated (S553). If the answer is "YES", the CPU 103 deletes the previous input characters (S554), and returns to S551.

[0137] If the answer to the question of S553 is "NO", then the CPU 103 determines whether the key "end" displayed at the bottom right of the pseudo-keyboard has been operated (S555). If the answer is "YES", then the CPU 103 determines whether the password input and defined is a correct password (S556). If the answer is "YES", then the CPU 103 executes input process (S557). If the answer to the question of S556 is "NO", this indicates that an incorrect password has been input, so that the CPU 103 provides display to the effect that the password is inappropriate (S559), and returns to S550 to make a request to input a password again.

[0138] If the answer to the question of S555 is "NO", then the CPU 103 determines whether the key "return" displayed at the bottom right of the password input screen shown in Fig. 22B has been operated (S558). If the answer is "YES", the CPU 103 returns to S540 which is the start step of the parameter change process. If the answer is "NO", the CPU 103 returns to S550.

[0139] Fig. 37 is a flowchart showing the input process. First, the CPU 103 displays the payout setting screen A of Fig. 23 as an initial setting screen (S560). Then, the CPU 103 determines whether the screen switching button displayed at the top center of the payout performance setting screen has been operated (S561), and if the answer is "YES", the CPU 103 displays a payout performance setting screen corresponding to the input operation (S562) and returns to S561. If the answer is "NO", then the CPU 103 determines whether the "determination" button displayed at the left bottom of the payout performance setting screen has been operated (S563). If the answer is "YES", the CPU 103 stores and saves the payout performance which is currently displayed (S564), and returns to the payout/probability modifying process. If the answer is "NO", the CPU 103 returns to S561 and waits for the next input.

[0140] Fig. 38 is a flowchart showing the effect control process at the start. First, the CPU 203 performs the BR

generation lottery process (S660). The BR generation lottery process is a process for determining whether to generate a battle rush which is a special game. Details will be described later. Then, the sub-CPU 203 performs BR execution process (S680). The BR execution process performs notification of a stop order during the BR. Details will be described later.

[0141] Fig. 39 is a flowchart showing the BR generation lottery process. First, the sub-CPU 203 checks the BR flag stored in the sub-RAM 205, and determines whether a GR game is being played (S661). If the answer is "YES", the sub-CPU 203 directly returns to the effect control process at start. If the answer is "NO", the sub-CPU 203 refers to the BR generation and BR continuation period lottery table shown in Fig. 20 and determines whether any of the BR continuation periods has been won (S662 and S663). If the answer is "NO" (blank), the sub-CPU 203 returns to the effect control process at the start. If the answer is "YES", the sub-CPU 203 turns on the BR flag of the sub-RAM 205, sets a continuation period which has won any of the BR continuation periods (S664), executes a BR generation effect (S665), and returns to the effect control process for the start period.

[0142] Fig. 40 is a flowchart showing the BR execution process. First, the sub-CPU 203 check the BR flag and the BR withdrawal flag of the sub-RAM 205 and determines whether a BR is being played or a bonus occurs during a BR and the BR is temporarily suspended (S681). If the answer is "NO", this indicates that a BR is not being played, so that the sub-CPU 203 returns to the effect control process at the start. If the answer is "YES", then the sub-CPU 203 checks the reception flag of the sub-RAM 205, and determines whether the bonus winning combination has got the internal winning (S682). If the answer is "YES", the sub-CPU 203 turns off the BR flag of the sub-RAM 205 to suspend the BR and turns on the BR withdrawal flag of the same to allow the player to enjoy the bonus game (S683), and returns to the effect control process at start.

[0143] If the answer to the question of S682 is "NO", then the sub-CPU 203 turns off the BR withdrawal flag of the sub-RAM 205 and turns on the BR flag of the same to restart the BR during BR withdrawal (S684). Then, to check whether all the BR continuation period has been consumed, the sub-CPU 203 checks the BR continuation period of the sub-RAM 205 and determines whether the BR continuation period has reached "0" (S685). If the answer is "YES", this indicates that the BR has come to an end, so that the sub-CPU 203 turns off the BR flag (S686) and returns to the effect control process for the start period.

[0144] If the answer is "NO", this indicates that a specified number of BR games have not yet been played, and the sub-CPU 203 checks the reception flag of the sub-RAM 205 and determines whether a "bell" or "SB" winning combination has got internal winning in the current game (S687). If the answer is "YES", the sub-CPU

203 refers to the kind of selected stop table stored in the reception flag of the sub-RAM 205 and notifies an appropriate stop order (S688), and returns to the effect control process for the start period. If the answer is "NO", the sub-CPU 203 notifies nothing and returns to the effect control process at the start.

[0145] Then, effect control process to be executed when the stop buttons 15L, 15C, and 15R are operated during the BR will be described below. Fig. 41 is a flowchart showing the effect control process to be executed during the stop period of the reels. First, the sub-CPU 203 checks the BR flag of the sub-RAM 205 and determines whether the BR is being played (S700), and if the answer is "NO", the sub-CPU 203 directly returns to the main process of the sub-CPU 203. If the answer is "YES", then the sub-CPU 203 checks the stop command of the reception flag of the sub-RAM 205 and collates stop order data and stop reel data with data of a table number used, and determines whether the current stop operation conforms to a correct press order specified in the stop table (S701). If the answer is "YES", the sub-CPU 203 provides display to the effect that the stop operation has been performed in a correct press order (S702). If the answer is "NO", the sub-CPU 203 provides display to the effect that the stop operation has been performed in an incorrect press order (S703), and returns to the main flow of the sub-CPU 203.

[0146] The effect control process to be executed after all the reels have stopped will be described below. Fig. 42 is a flowchart showing effect control process to be executed at the end of one game. First, the sub-CPU 203 executes preview notice generation process for determining whether to generate an advance notice effect for an internal winning combination (S720), and if the current game status is a BR, the sub-CPU 203 executes parameter updating process for updating associated parameters (S740). Then, if generation of the preview notice is determined in the preview notice generation process, the sub-CPU 203 executes effect process (S760), and returns to the main process of the sub-CPU 203.

[0147] Fig. 43 is a flowchart showing the preview notice generation process. First, the sub-CPU 203 checks the reception flag of the sub-RAM 205, and determines whether the current game state is the general game (S721). If the answer is "YES", the sub-CPU 203 refers to the preview notice generation table shown in Fig. 21A and executes a preview notice generation lottery (S722), and then determines whether the lottery has been won (S723). If the answer is "YES", the sub-CPU 203 refers to the effect type selection table shown in Fig. 21 B and executes effect mode determining process for determining the mode of the preview effect (S724), and returns to the effect control process to be executed at the end of one game. If the answer is "NO", the sub-CPU 203 directly returns to the effect control process to be executed at the end of one game.

[0148] Fig. 44 is a flowchart showing the parameter updating process. First, the sub-CPU 203 checks a one-

game end command of the reception flag stored in the sub-RAM 205, and determines whether the current game state is a bonus game (S741), and if the answer is "YES", this indicated that the BR is not at all being played, so that the sub-CPU 203 directly returns to the effect control process to be executed at the end of one game. If the answer is "NO", then the sub-CPU 203 checks the BR flag stored in the sub-RAM 205, and determines whether the BR is being played (S742). If the answer is "NO", the sub-CPU 203 directly returns to the effect control process to be executed at the end of one game. If the answer is "YES", the sub-CPU 203 decrements a BR continuation period counter of the sub-RAM 205 (S743), and returns to the effect control process to be executed at the end of one game.

[0149] In the description of this embodiment, reference has been made to the game in the ST as a status advantageous to the player, but the above-described AT may also be used. As another status advantageous to the player, a winning flag for a particular winning combination may also be set, or the internal winning probability of the winning combination may also be increased.

[0150] The present invention can be similarly applied to not only slot machines such as the above-described embodiment but also pachinko machines having display devices, and arcade gaming machines having the same, and further to domestic games which execute the above-described functions in an emulating manner on software. In the foregoing, the sub-control circuit and the main control circuit are separately installed. However, it should be understood that the sub-control circuit may be included in the main control circuit or that the main control circuit may have the functions the sub-control circuit is supposed to have. Thus, the separate sub-control circuit may not have to be installed.

[0151] According to the above-described construction, it is possible to reduce disadvantages such as dead stock and increased assembly steps which occur when a physical acrylic plate and a symbol cell sheet are used, whereby it is possible to provide gaming machines having superior cost performance.

Claims

1. A gaming machine comprising:

variable display means for variably displaying a plurality of symbols;
lottery means for executing a lottery of a winning combination; and
stop means for controlling the variable display means to shift from variably displaying the plurality of symbols to statically displaying at least one of the plurality of symbols based on a result of the lottery,

wherein the stop means includes one or more

stop buttons operable by a player;

wherein the one or more stop buttons are provided below the variable display means; and

wherein a lower display means is provided below the one or more stop buttons.

2. The gaming machine according to claim 1, wherein an optically transmissive electric display means is provided in front of the variable display means.

3. The gaming machine according to claim 2, further comprising: special game control means for generating a special game state advantageous to the player based on a predetermined condition;

wherein the optically transmissive electric display device is controlled for shielding an optical view from the variable display means in the special game state based on another predetermined condition.

4. A gaming machine for executing a lottery of a winning combination being composed of a combination of a plurality of symbols, the gaming machine comprising:

a variable display device for variably displaying the plurality of symbols;

one or more stop buttons provided below the variable display device, the one or more stop buttons being utilized for controlling the variable display device to shift from variably displaying the plurality of symbols to statically displaying at least one of the plurality of symbols; and
an electric display device provided below the one or more stop buttons.

5. The gaming machine according to claim 4, wherein the variable display device and the one or more stop buttons are visible to and optionally operable by a player.

6. The gaming machine according to claim 4 or 5, wherein an optically transmissive electric display device is provided in front of the variable display device.

7. The gaming machine according to claim 6, wherein the gaming machine generates a special game mode advantageous to the player based on a predetermined condition, the optically transmissive electric display device being controlled for shielding an optical view from the variable display device during the special game mode.

8. The gaming machine according to claim 6 or 7, wherein the optically transmissive electric display device displays an effect image in the special game mode.

9. The gaming machine according to claim 8, wherein the effect image in the special game mode is determined by an operation order of the one or more stop buttons.

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Fig. 1

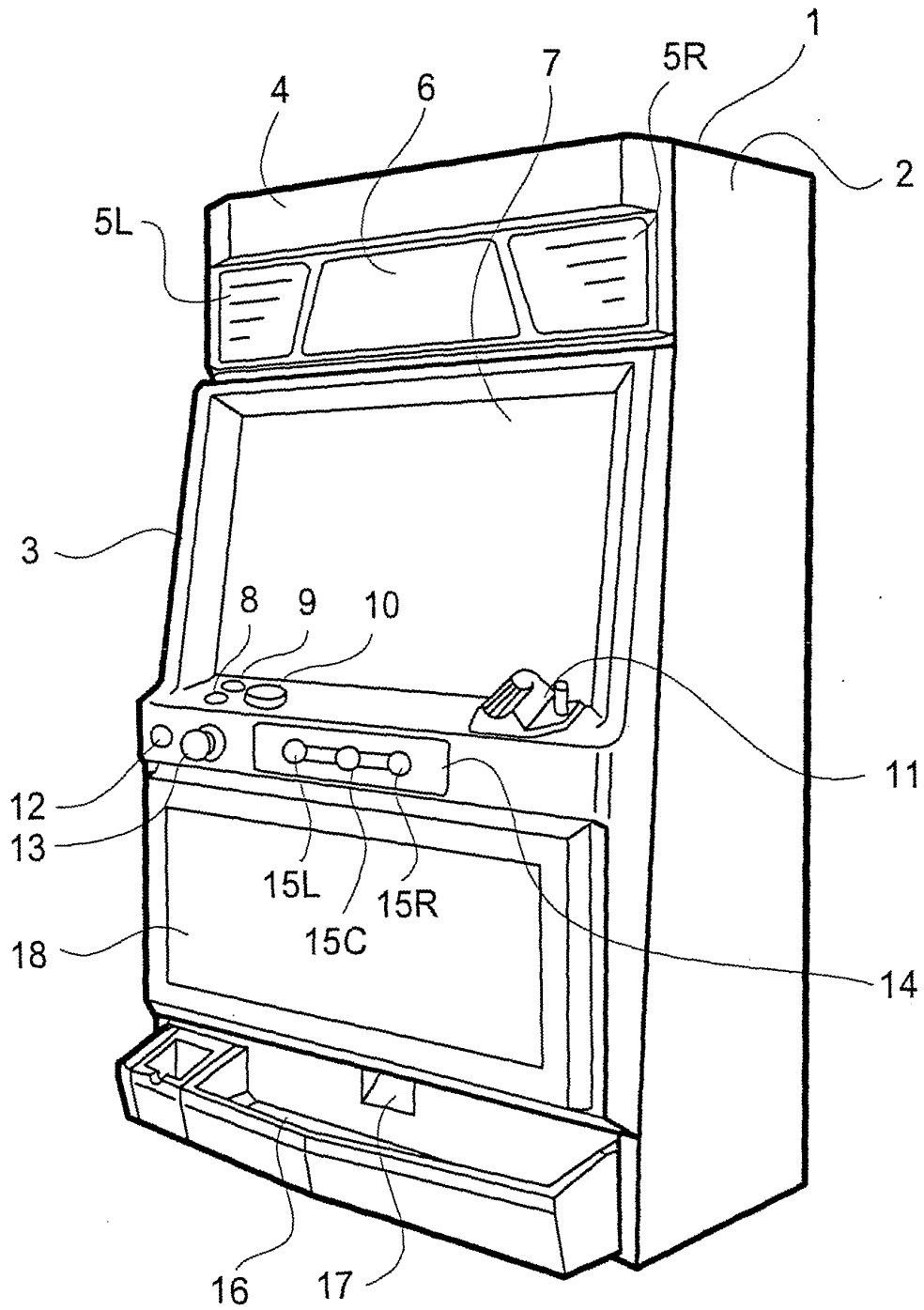


Fig. 2

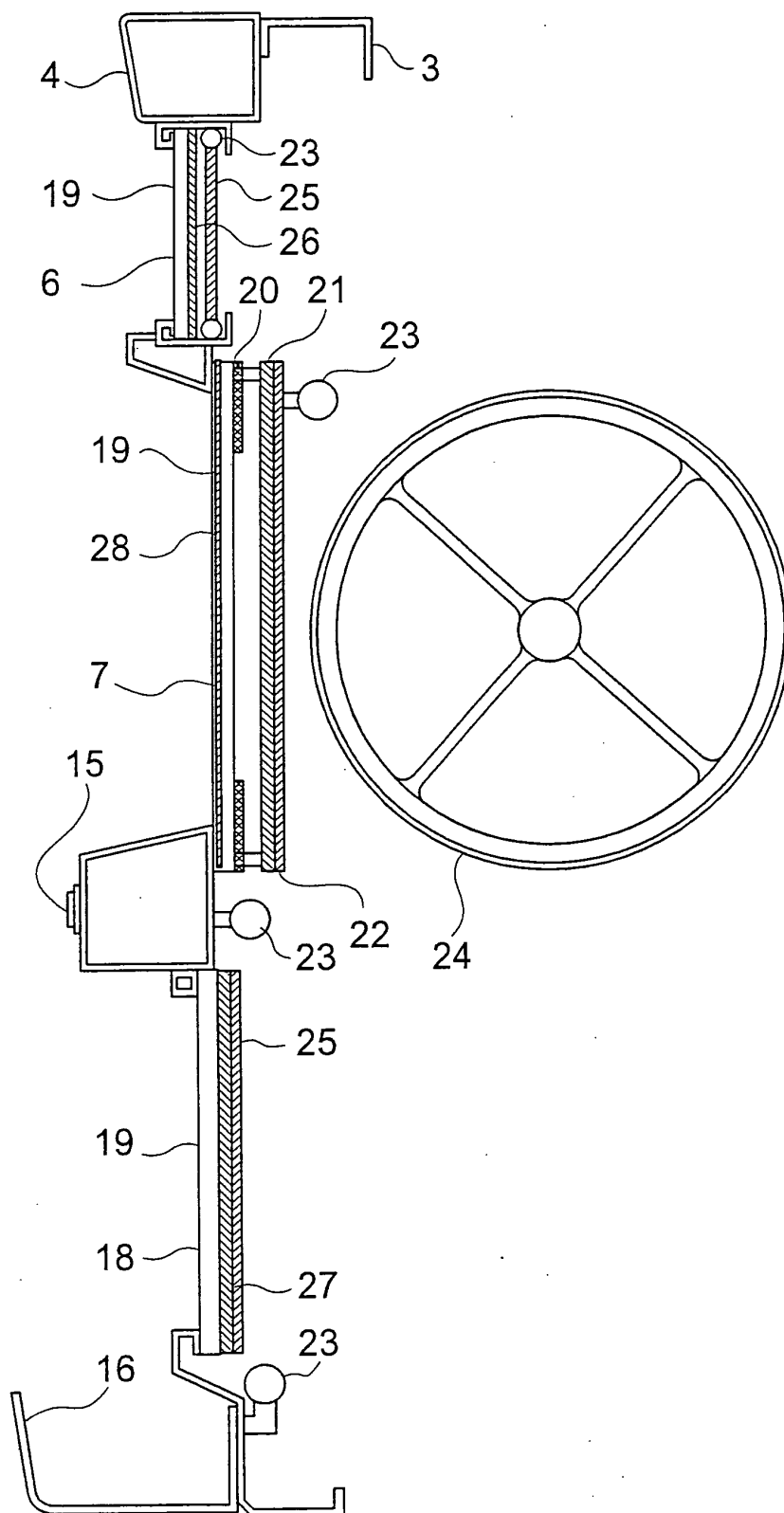


Fig. 3

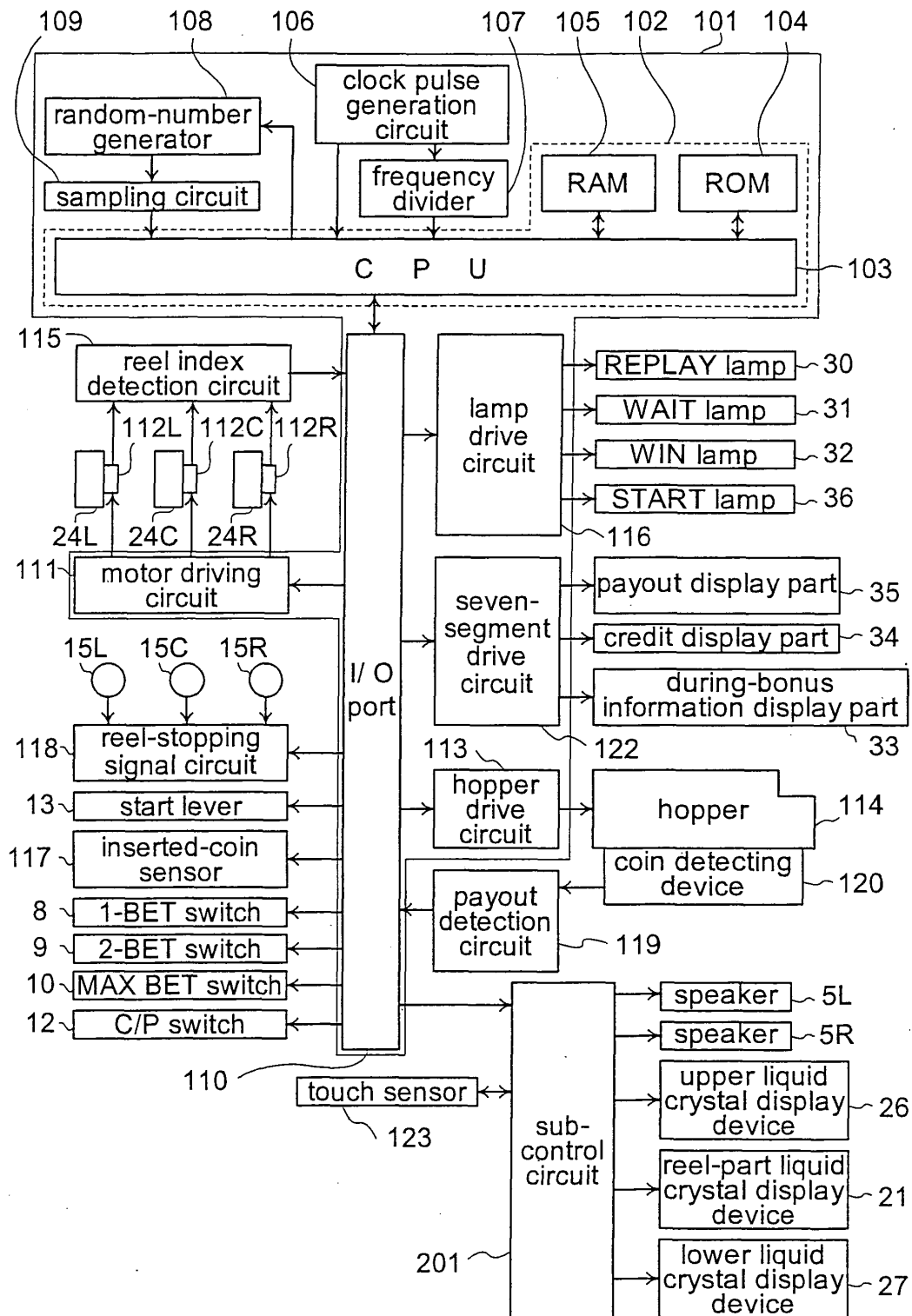


Fig. 4

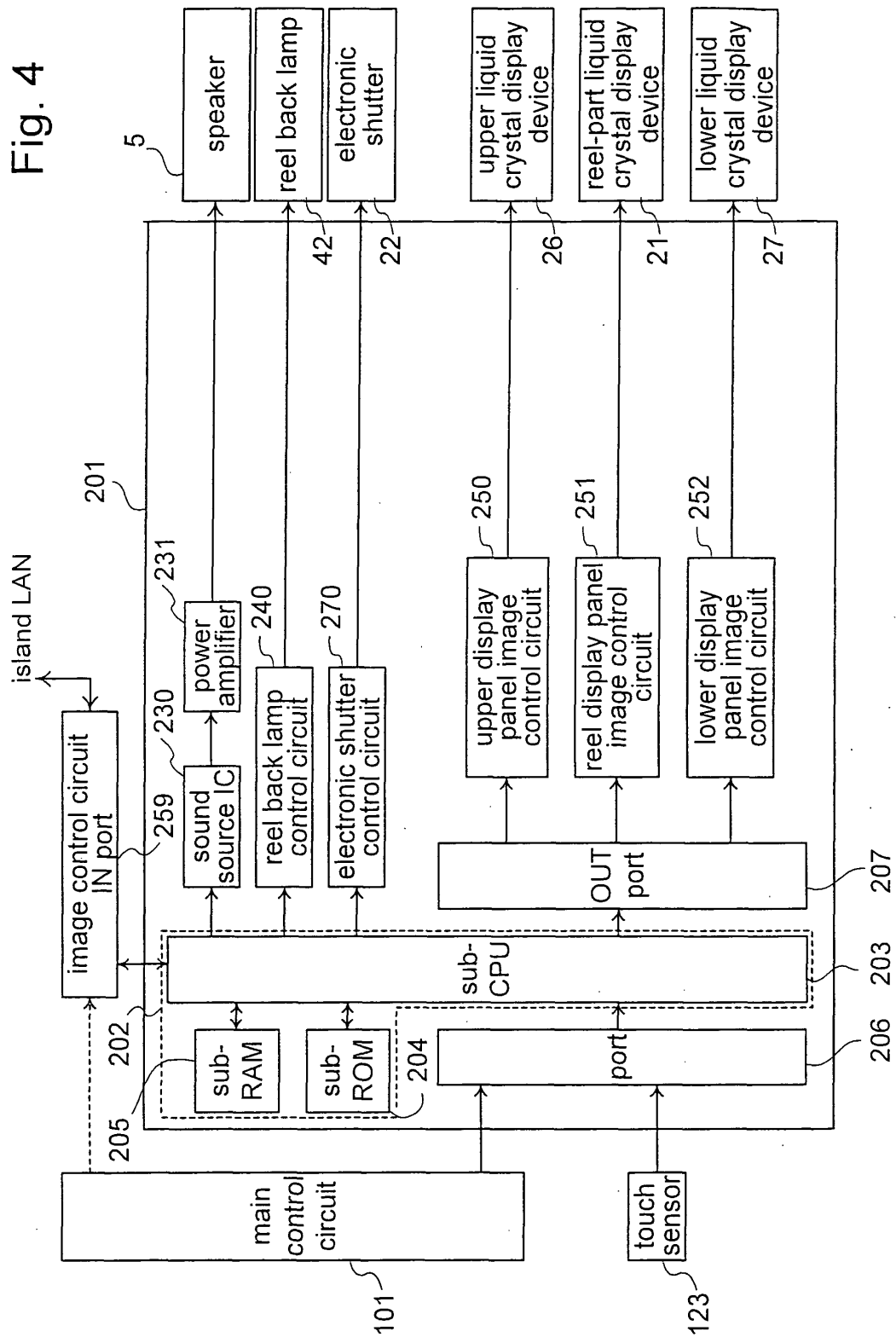


Fig. 5

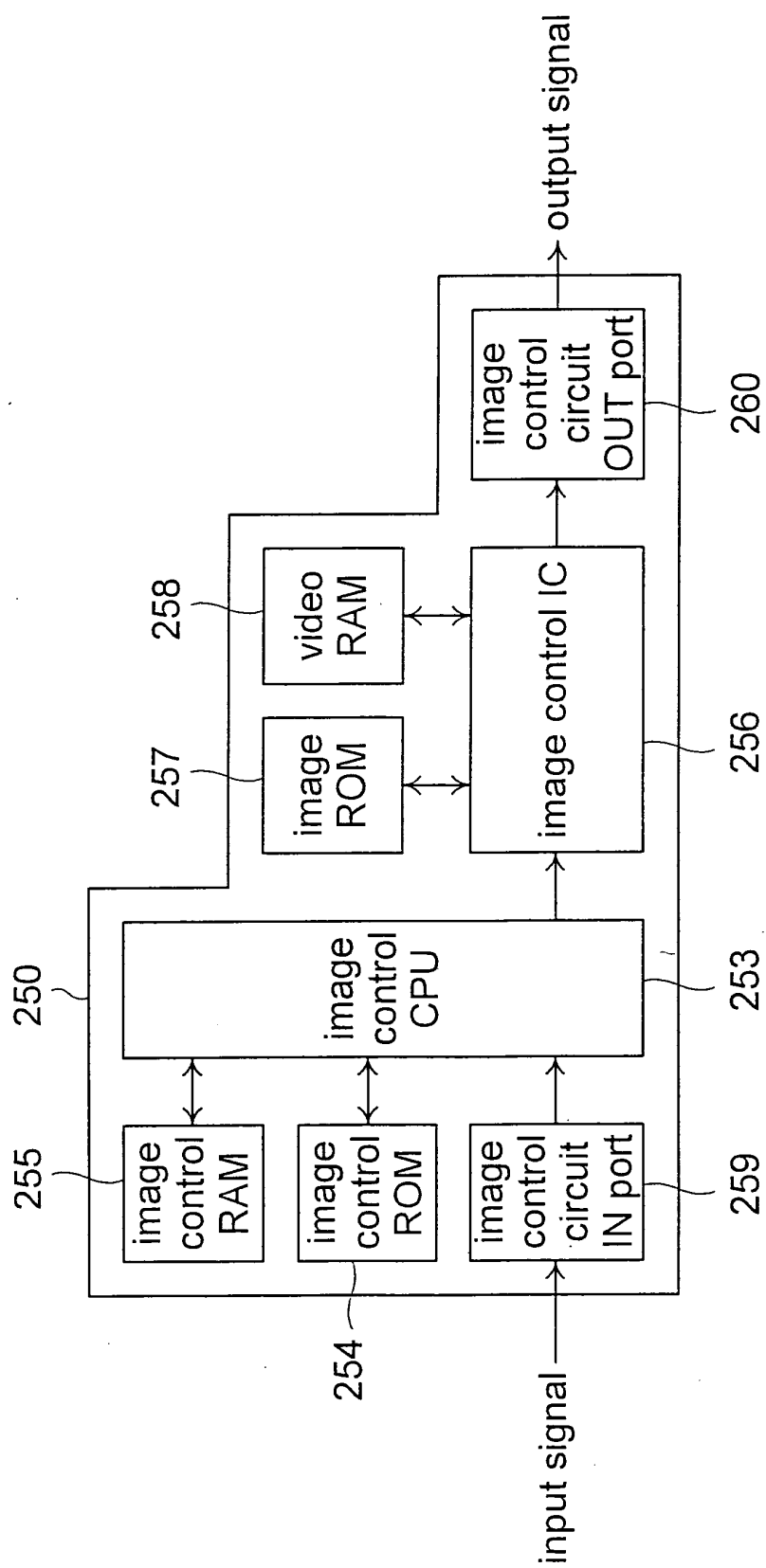


Fig. 6

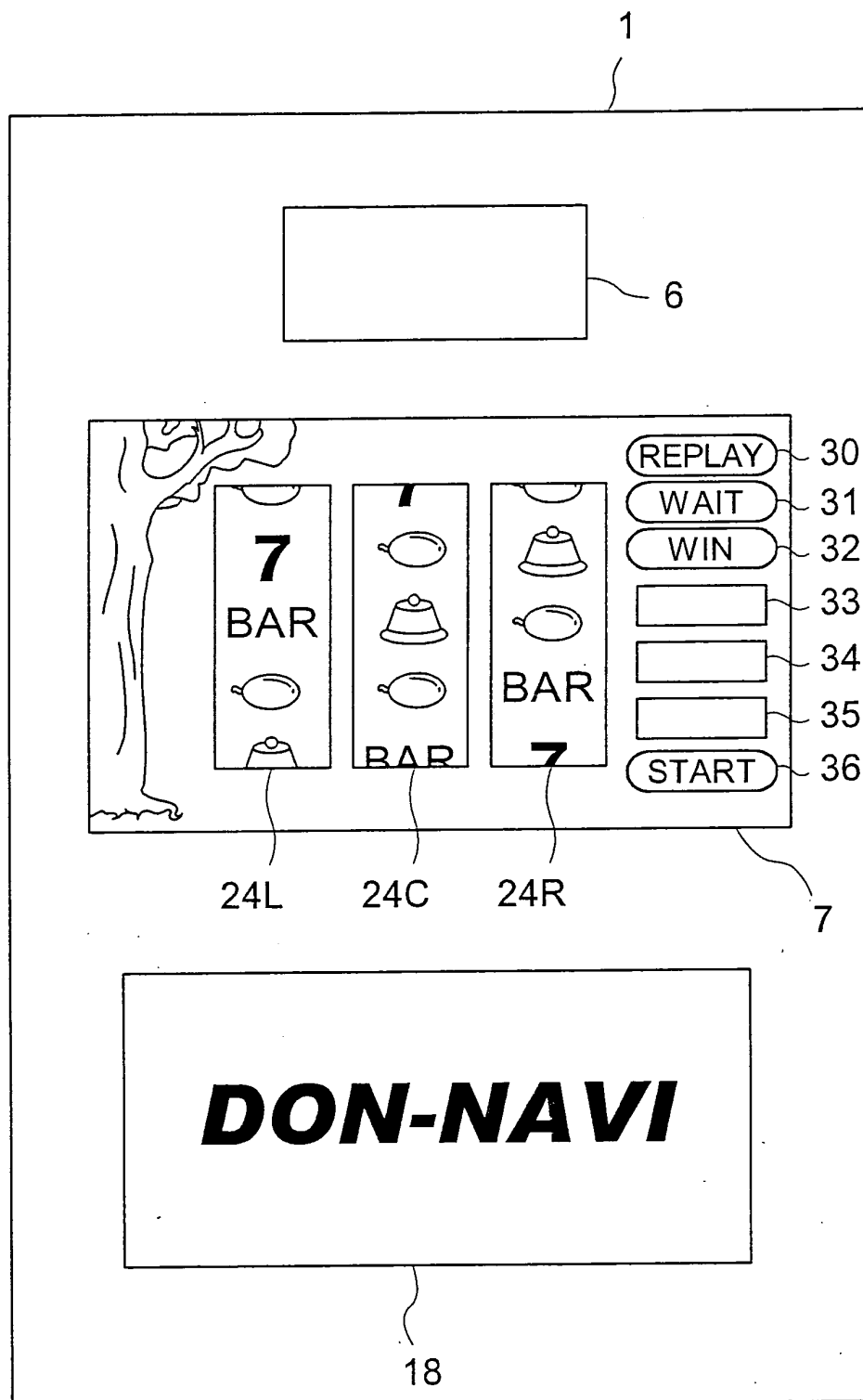


Fig. 7A

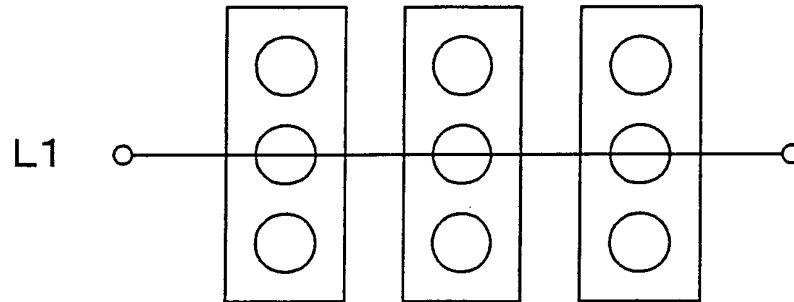


Fig. 7B

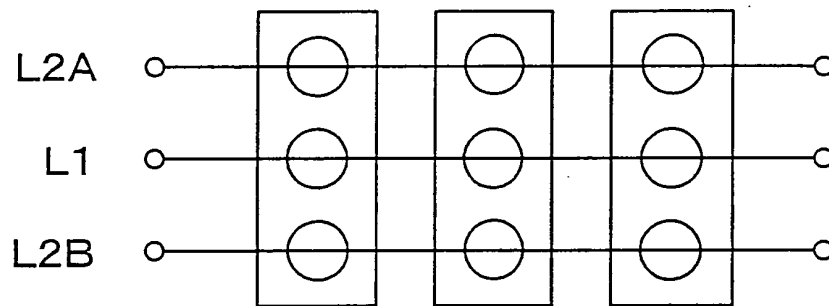


Fig. 7C

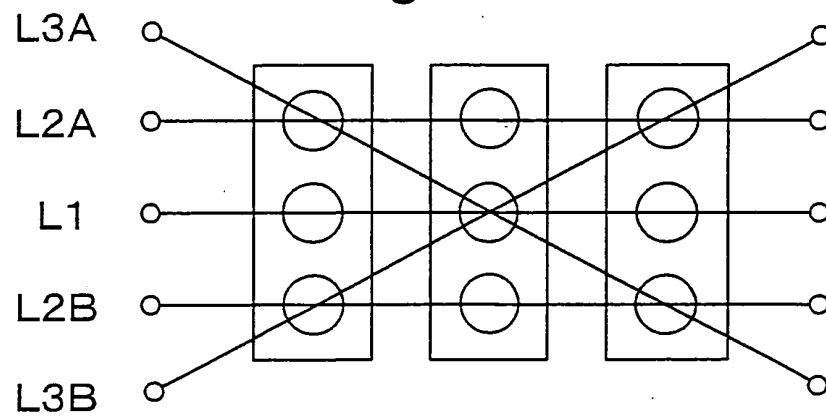


Fig. 8

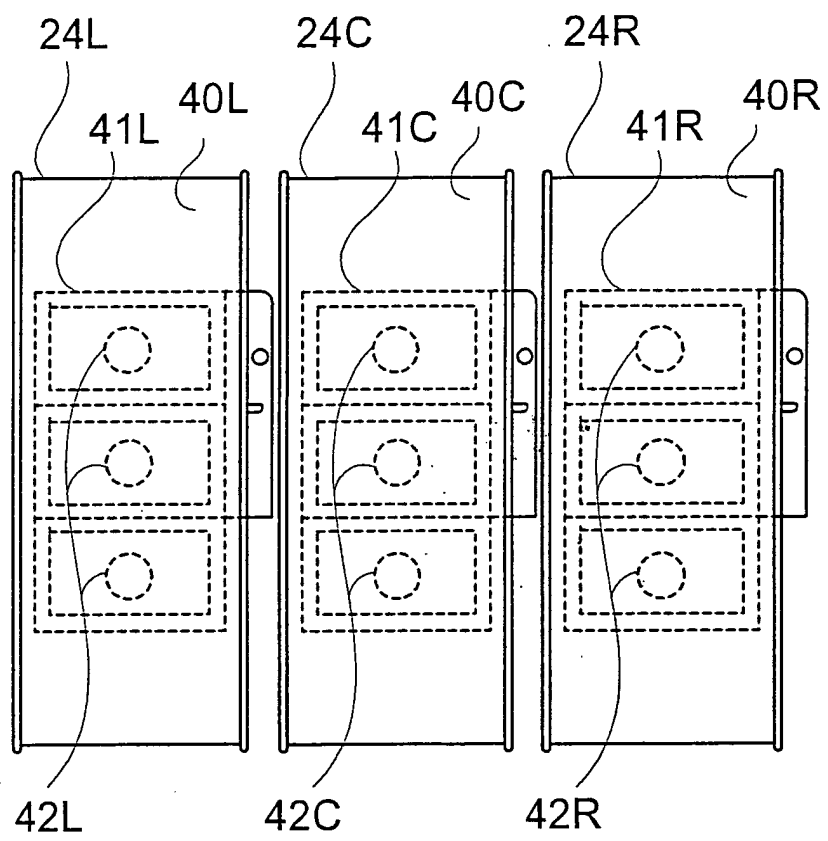


Fig. 9A

left reel	
21	red 7
20	cherry
19	bell
18	replay
17	red 7
16	BAR
15	replay
14	bell
13	sword 7
12	cherry
11	bell
10	replay
9	BAR
8	sword 7
7	bell
6	replay
5	sword 7
4	watermelon
3	bell
2	replay
1	sword 7
40L'	

Fig. 9B

center reel	
21	red 7
20	replay
19	watermelon
18	sword 7
17	bell
16	sword 7
15	replay
14	cherry
13	bell
12	sword 7
11	replay
10	watermelon
9	BAR
8	bell
7	red 7
6	replay
5	bell
4	replay
3	BAR
2	sword 7
1	bell
40C'	

Fig. 9C

right reel	
21	cherry
20	bell
19	replay
18	sword 7
17	watermelon
16	bell
15	replay
14	sword 7
13	BAR
12	bell
11	replay
10	sword 7
9	watermelon
8	replay
7	bell
6	replay
5	BAR
4	red 7
3	bell
2	replay
1	sword 7
40R'	

Fig. 10

symbol combination	during general game (bonus-internal- winning lasting)	general game of BB lasting	JAC (combinations) game
red 7-red 7-red 7	15 coins + BB		
BAR—BAR—BAR	15 coins + RB		
sword 7-sword 7- sword 7	15 coins + SB		
watermelon- watermelon- watermelon	3 coins	15 coins	
bell-bell-bell	6 coins	7 coins	
cherry-ANY-ANY	1 coin	1 coin	
replay-replay- replay	replay	1 coin + RB	15 coins

Fig. 11

table No.	left center right	left right center	center left right	center right left	right left center	right center left
1	○	x	x	x	x	x
2	x	○	x	x	x	x
3	x	x	○	x	x	x
4	x	x	x	○	x	x
5	x	x	x	x	○	x
6	x	x	x	x	x	○

○ prize won

x prize not won

* observation push timing not required

Fig. 12

winning combination	random-number range	winning probability
SB	0~2298	2299/16384
bell	2299~11024	8726/16384
watermelon	11025~11165	141/16384
cherry	11166~11385	220/16384
replay	11386~13630	2245/16384
BB	13631~13668	38/16384
RB	13669~13696	27/16384
blank	13697~16383	2686/16384

random-number range: 0~16383

Fig. 13

start command		reel stop command		one-game end command	
1	internal-winning combination	1	stop order	1	prize winning kind
	SB		first stop		SB
	bell		second stop		bell
	watermelon		third stop		watermelon
	cherry				cherry
	replay				replay
	BB				BB
	RB				RB
	blank				blank
3	game situation	3	stop reel	3	bonus game situation
	during general game		left reel		general game 1 in BB lasting
	RB internal winning lasting		center reel		general game 2 in BB lasting
	BB internal winning lasting		right reel		general game 3 in BB lasting
	RB acting				RB game 1
	BB acting				RB game 2
					RB game 3
					RB end
					BB end
5	selection stopping table	5	stop position	parameter change demand command	
	table No. 1			1	change request
	table No. 2				
	table No. 3			keyswitch-off command	
	table No. 4			1	keyswitch off
	table No. 5				
	table No. 6			initialization command	
				1	initialization request

Fig. 14 A

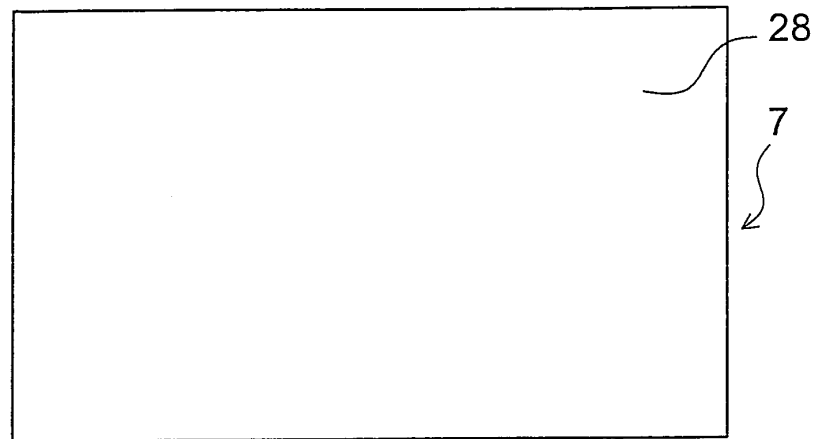


Fig. 14 B

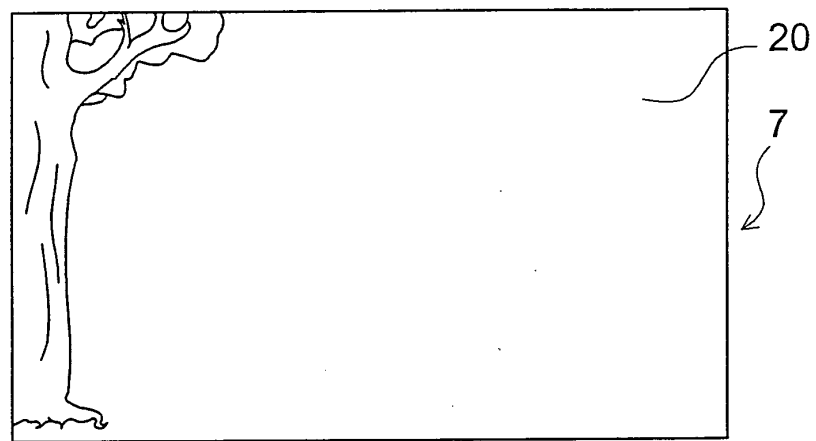


Fig. 14 C

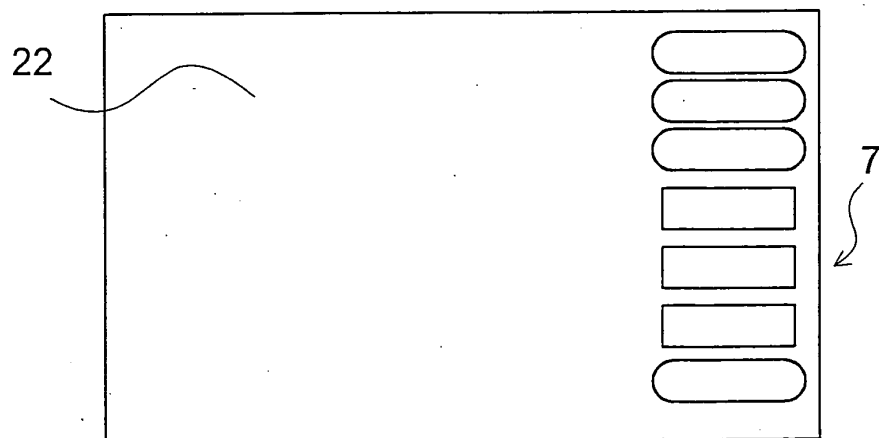


Fig. 15

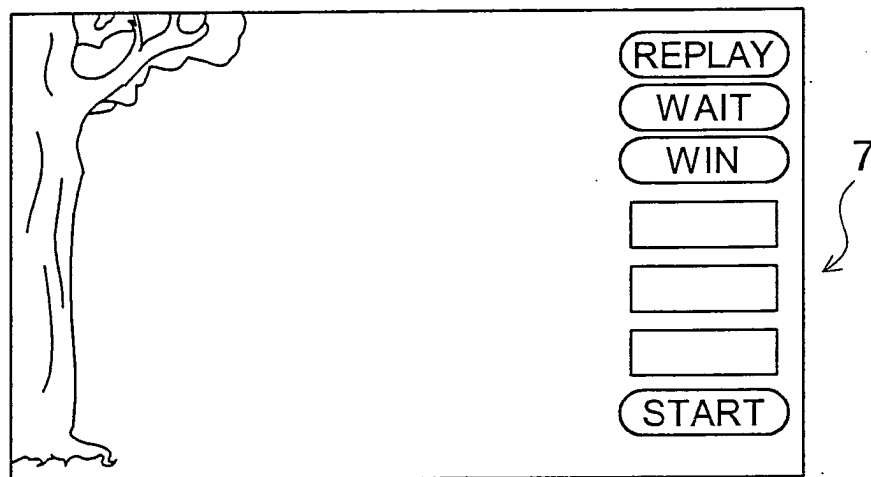


Fig. 16 A

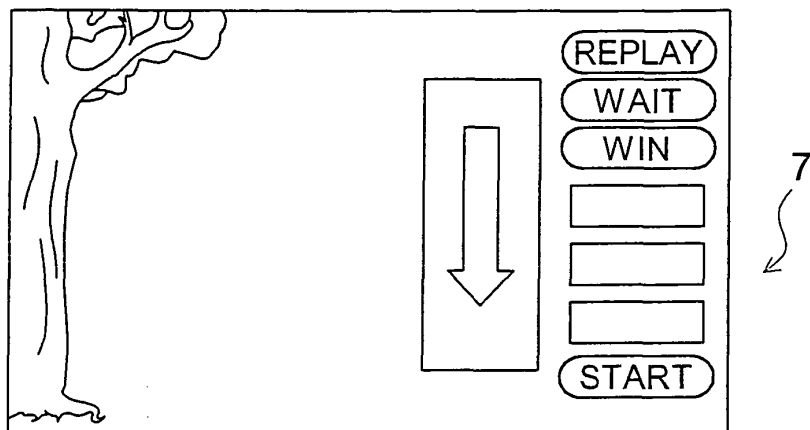


Fig. 16 B

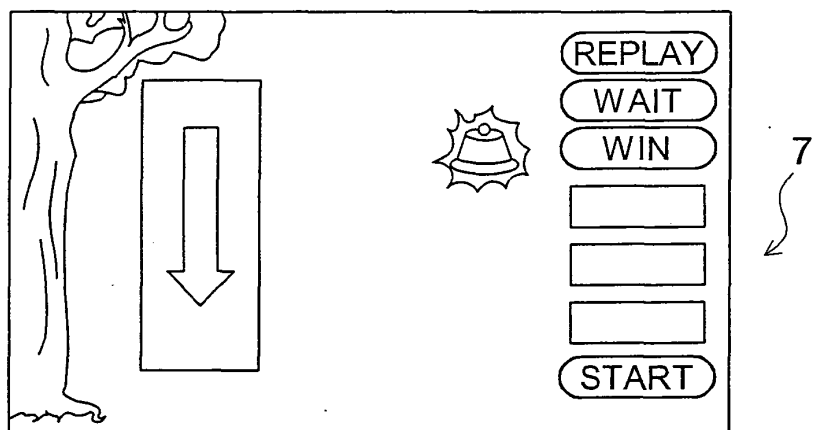


Fig. 16 C

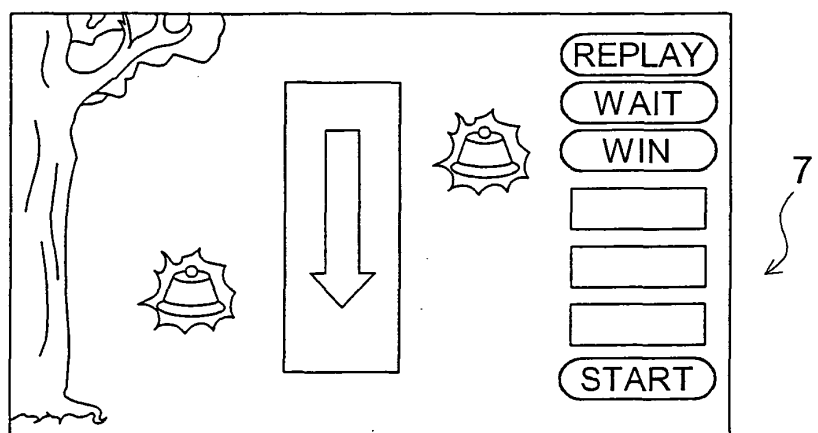


Fig. 17 A

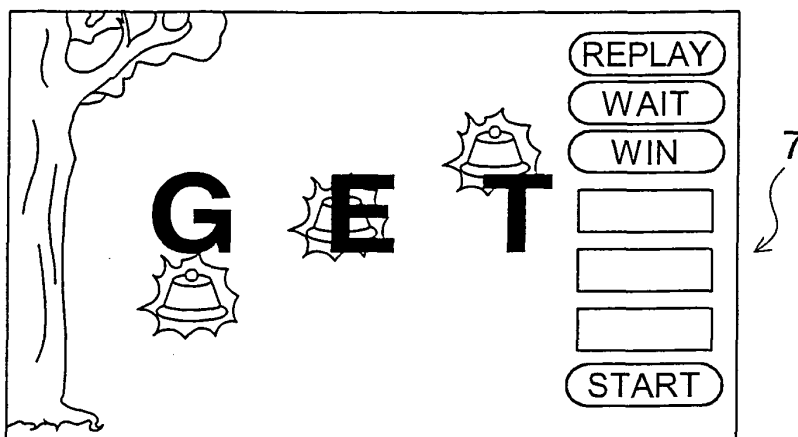


Fig. 17 B

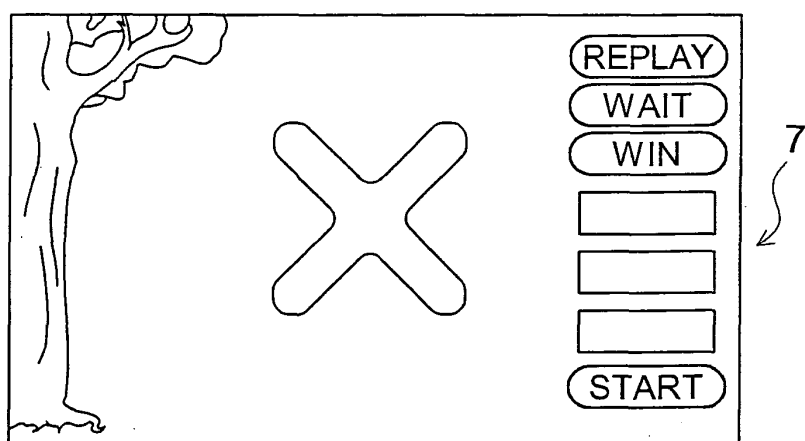


Fig. 17 C

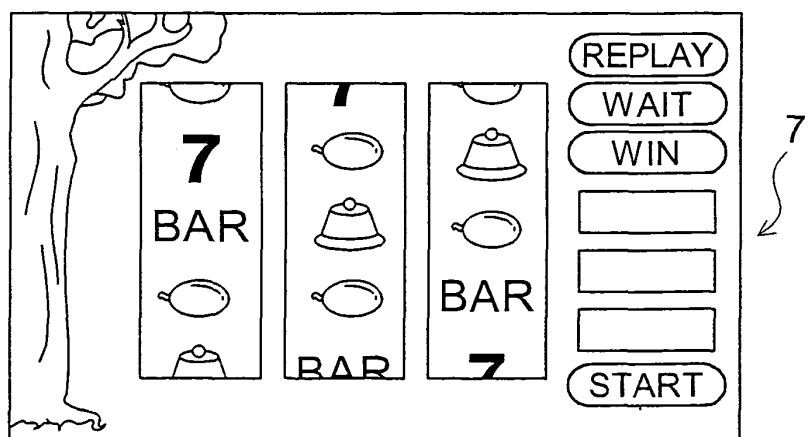


Fig. 18 A

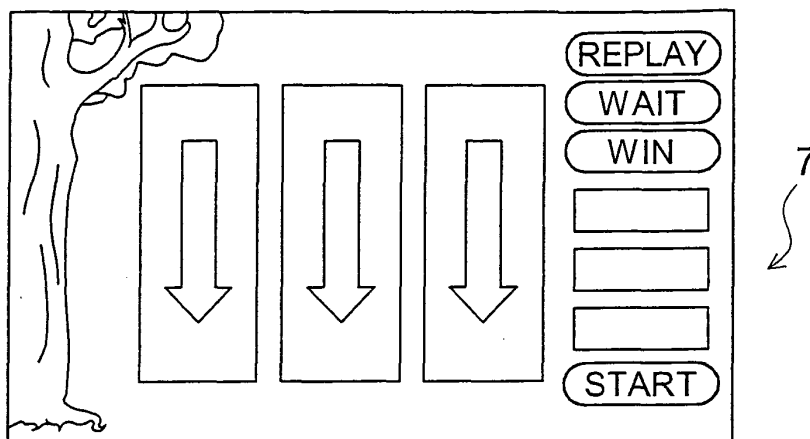


Fig. 18 B

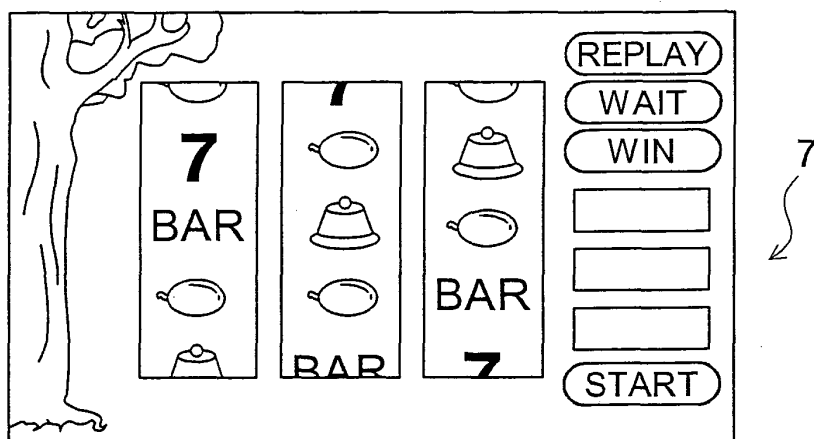


Fig. 18 C

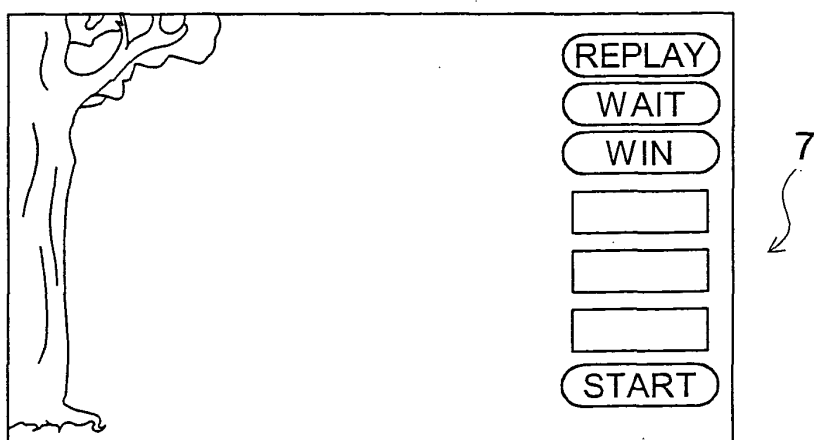


Fig. 19 A

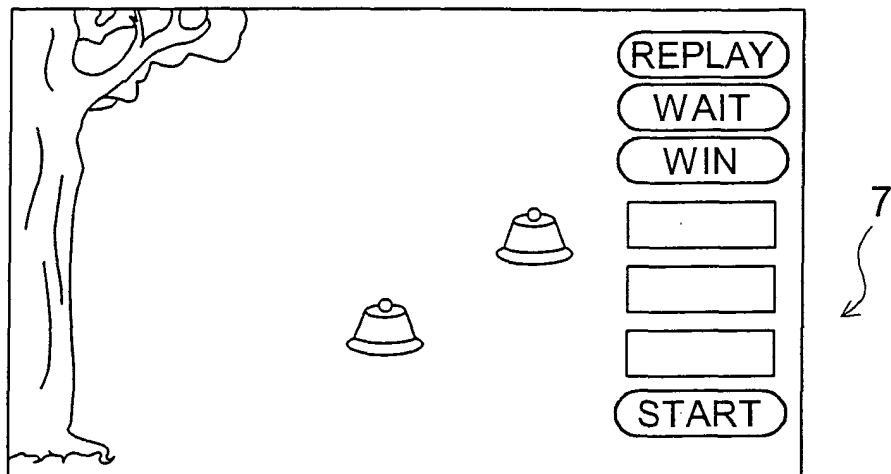


Fig. 19 B

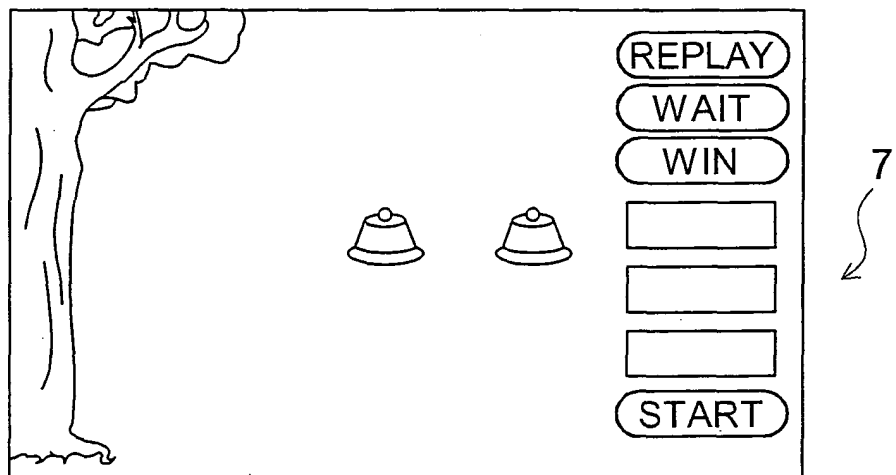


Fig. 20

established flag	BR continuation frequency			
	10 games	50 games	100 games	blank
watermelon	0~10	11~13	14~15	16~127
two cherries	0~6	7~10	—	11~127
blank	0~14	—	15~24	25~127

random-number range: 0~127

Fig. 21 A

winning kind	prize winning kind			
	BB	RB	watermelon	SB
winning	0~45	0~56	0~20	0~11
blank	46~127	57~127	24~127	12~127

random-number range: 0~127

Fig. 21 B

bell display number	prize winning kind			
	BB	RB	watermelon	SB
all	0~84	0~96	0~20	0~8
appearance number-1	85~121	97~127	21~52	9~21
appearance number-2	122~127	—	53~90	22~38
appearance number-3	—	—	91~116	39~95
appearance number-4	—	—	117~123	96~120
appearance number-5	—	—	124~127	121~127

random-number range: 0~127

Fig. 22 A

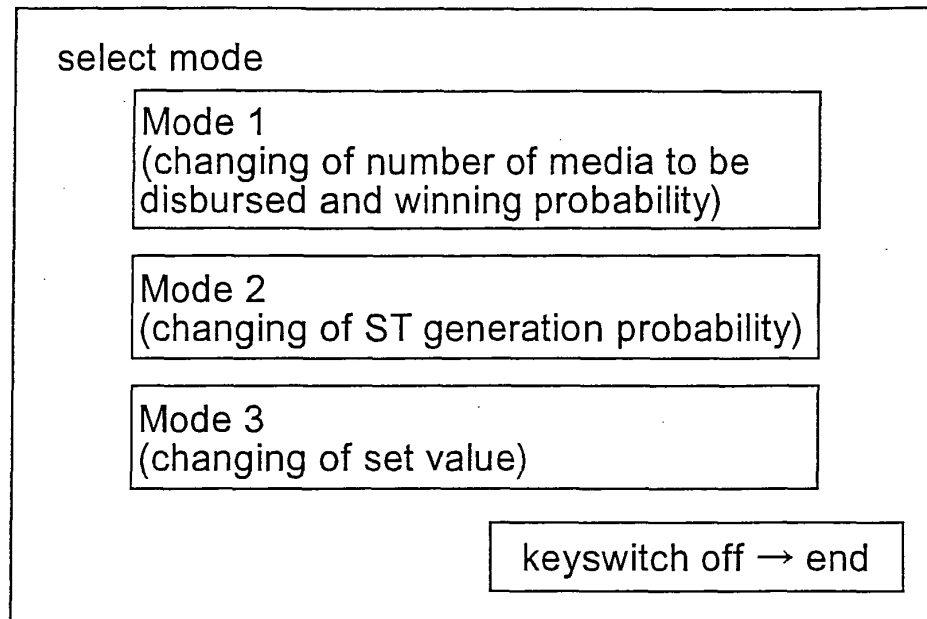


Fig. 22 B

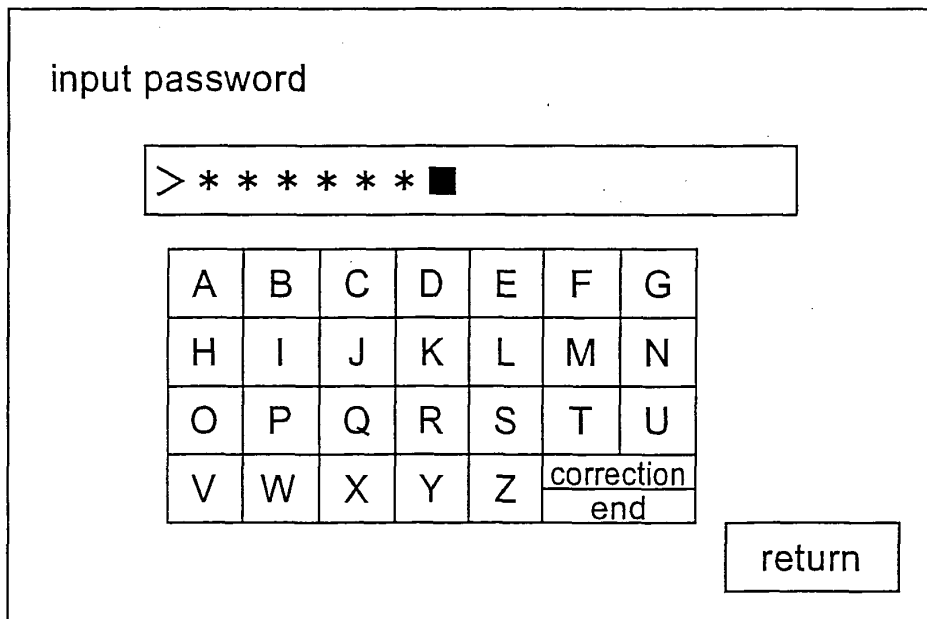


Fig. 23

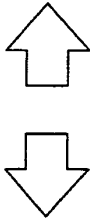


A

prize-winning combination	during general game		general game in BB lasting	
	number of media (coins) to be disbursed	internal-winning probability	payout real index	internal-winning probability
red 7-red 7-red 7	15 coins + BB	38 / 16384	—	—
BAR—BAR—BAR	15 coins + RB	27 / 16384	—	—
sword 7-sword 7-sword 7	15 coins + SB	2299 / 16384	—	—
watermelon-watermelon-watermelon	3 coins	141 / 16384	15 coins	2100 / 16384
bell-bell-bell	6 coins	8726 / 16384	7 coins	7080 / 16384
cherry-ANY-ANY	1 coins	220 / 16384	1 coins	230 / 16384
replay-replay-replay	replay	2245 / 16384	1 coin +(three times)	5400 / 16384
blank		2686 / 16384		1574 / 16384

determination

Fig. 24



B

prize-winning combination	during general game		general game in BB lasting	
	number of media (coins) to be disbursed	internal-winning probability	payout real index	internal-winning probability
red 7-red 7-red 7	15 coins + BB	38 / 16384	—	—
BAR—BAR—BAR	15 coins + RB	27 / 16384	—	—
sword 7-sword 7-sword 7	15 coins + SB	2299 / 16384	—	—
watermelon-watermelon-watermelon	15 coins	356 / 16384	15 coins	2100 / 16384
bell-bell-bell	6 coins	7688 / 16384	7 coins	7080 / 16384
cherry-ANY-ANY	2 coins	892 / 16384	1 coins	230 / 16384
replay-replay-replay	replay	2245 / 16384	1 coin +(three times)	5400 / 16384
blank		2837 / 16384		1574 / 16384

determination

Fig. 25













C

prize-winning combination	during general game		general game in BB lasting	
	number of media (coins) to be disbursed	internal-winning probability	payout real index	internal-winning probability
red 7-red 7-red 7	15 coins + BB	51 / 16384	—	—
BAR—BAR—BAR	15 coins + RB	38 / 16384	—	—
sword 7-sword 7-sword 7	15 coins + SB	1238 / 16384	—	—
watermelon-watermelon-watermelon	15 coins	152 / 16384	3 coins	3841 / 16384
bell-bell-bell	6 coins	8726 / 16384	3 coins	6046 / 16384
cherry-ANY-ANY	2 coins	220 / 16384	1 coin + RB(two times)	210 / 16384
replay-replay-replay	replay	2245 / 16384		1524 / 16384
blank				4763 / 16384











determination

Fig. 26 A

7	7	7	15 + BIG BONUS
BAR	BAR	BAR	15 + BIG BONUS
7	7	7	15 + REG BONUS
			3 coins (15 coins during BB)
			6 coins (7 coins during BB)
	—	—	1 coin
			replay (1 coin during BB + REG BONUS)

7
2

Fig. 26 B

7	7	7	15 + BIG BONUS
BAR	BAR	BAR	15 + BIG BONUS
7	7	7	15 + REG BONUS
			15 coins (15 coins during BB)
			6 coins (7 coins during BB)
	—	—	2 coins (1 coin during BB)
			replay (1 coin during BB + REG BONUS)

7
2

Fig. 27

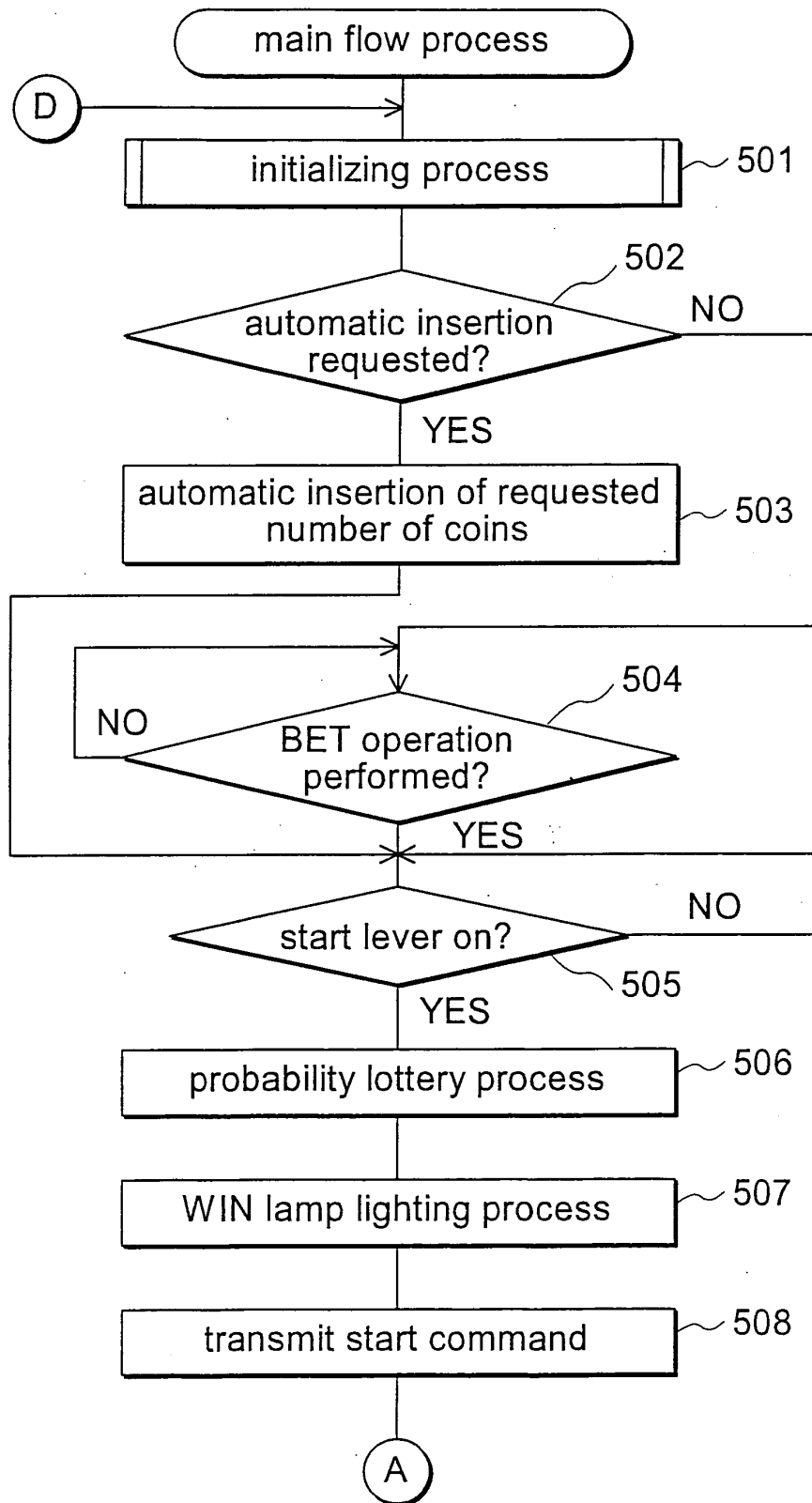


Fig. 28

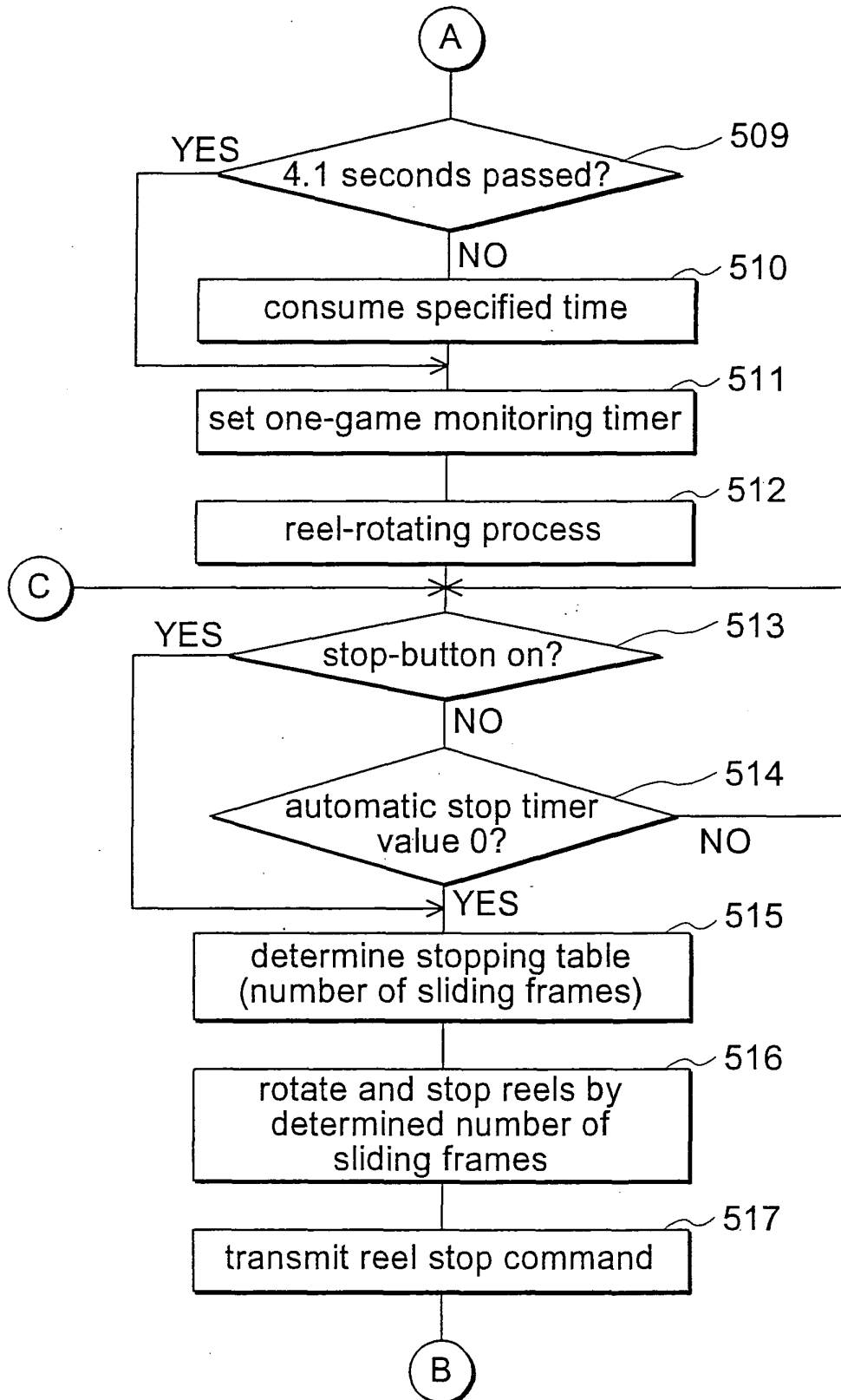


Fig. 29

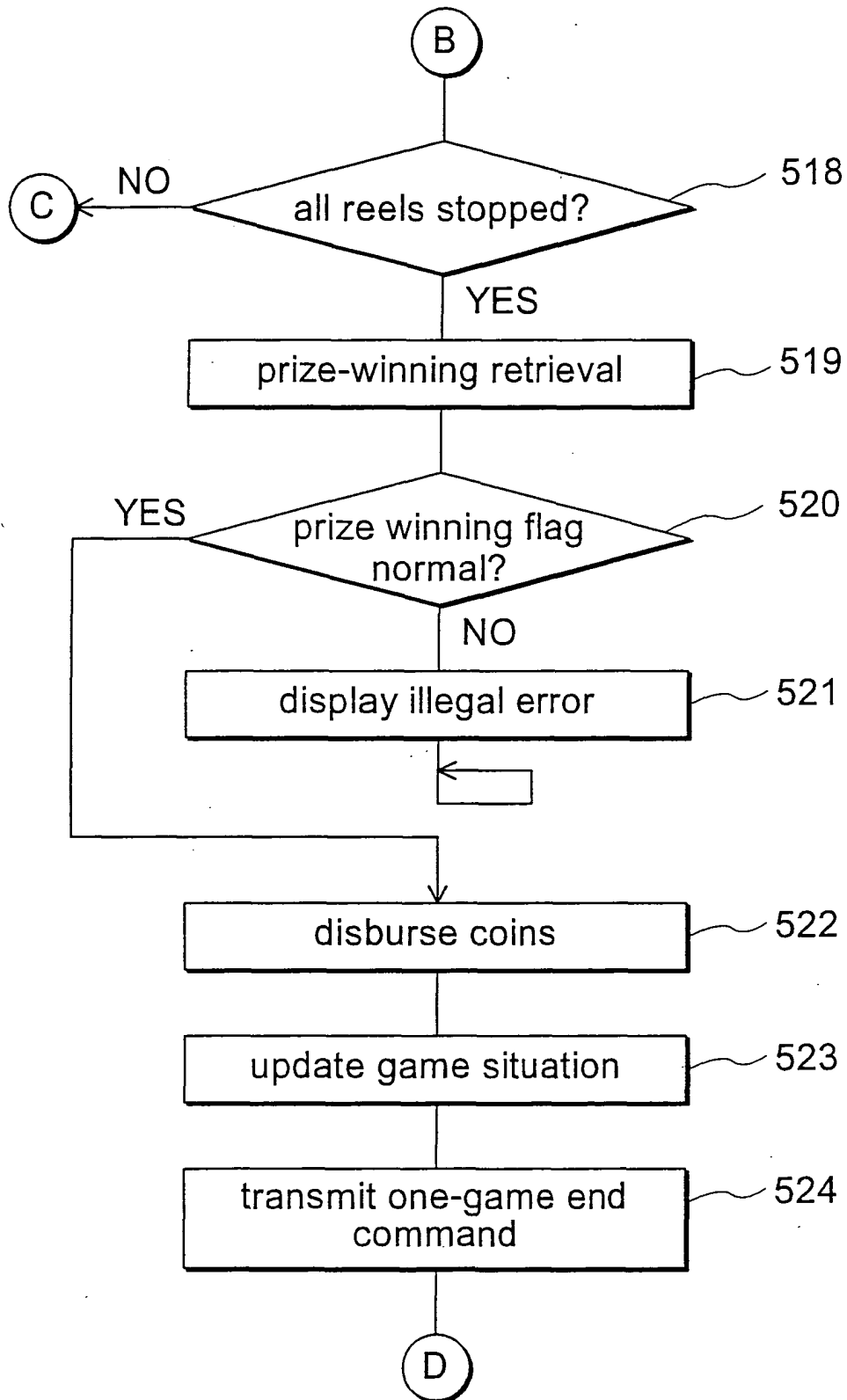


Fig. 30

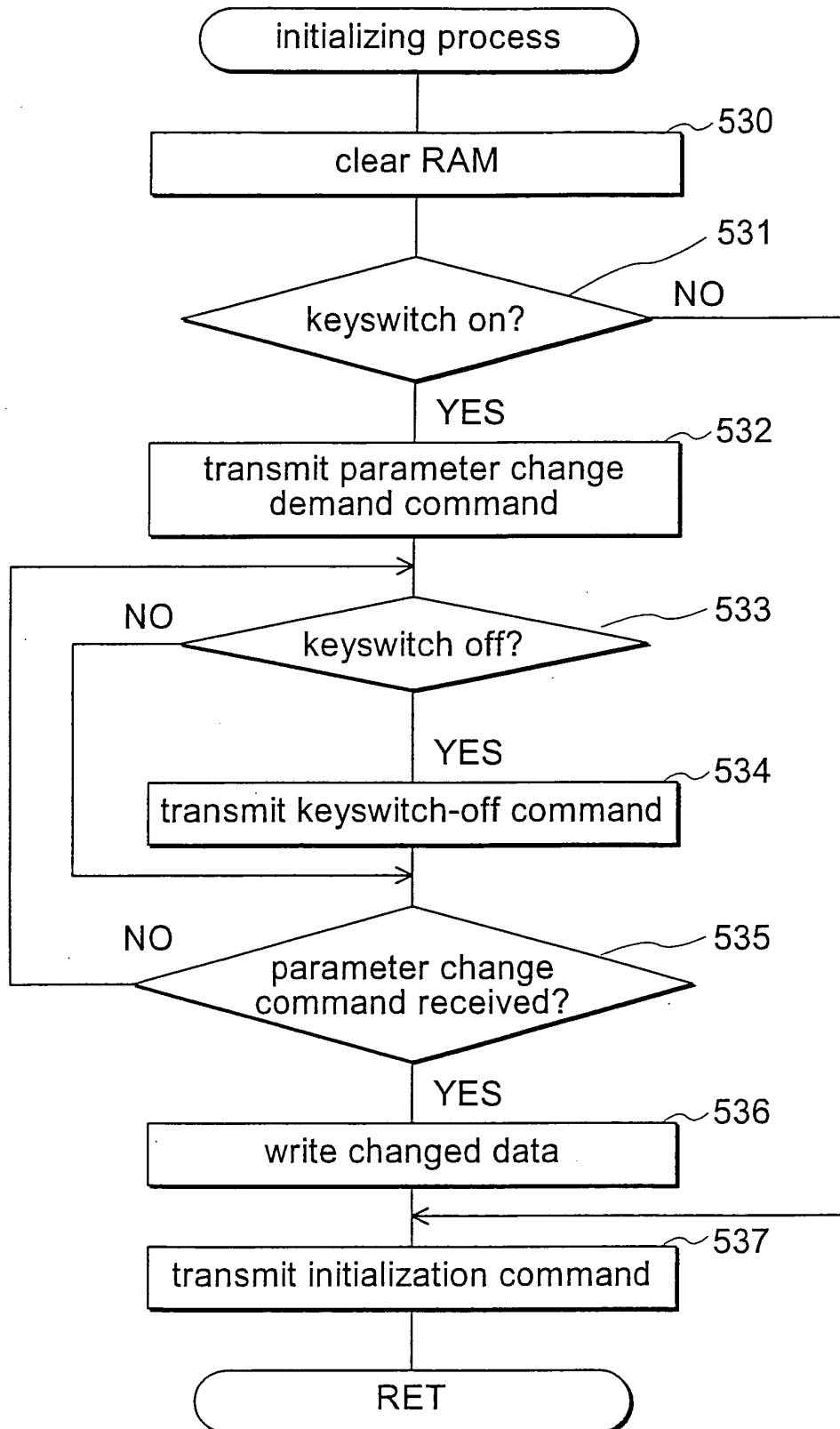


Fig. 31

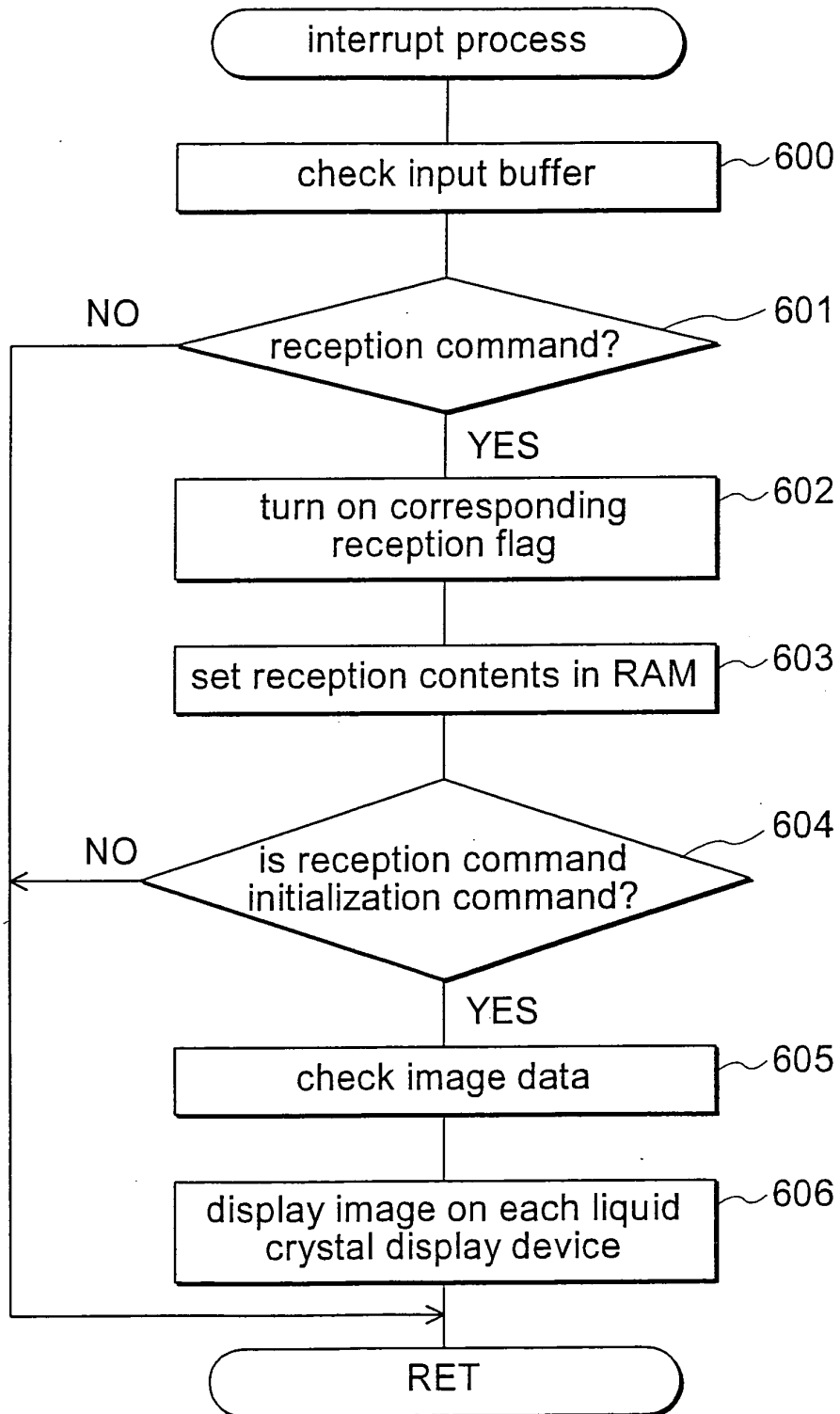


Fig. 32

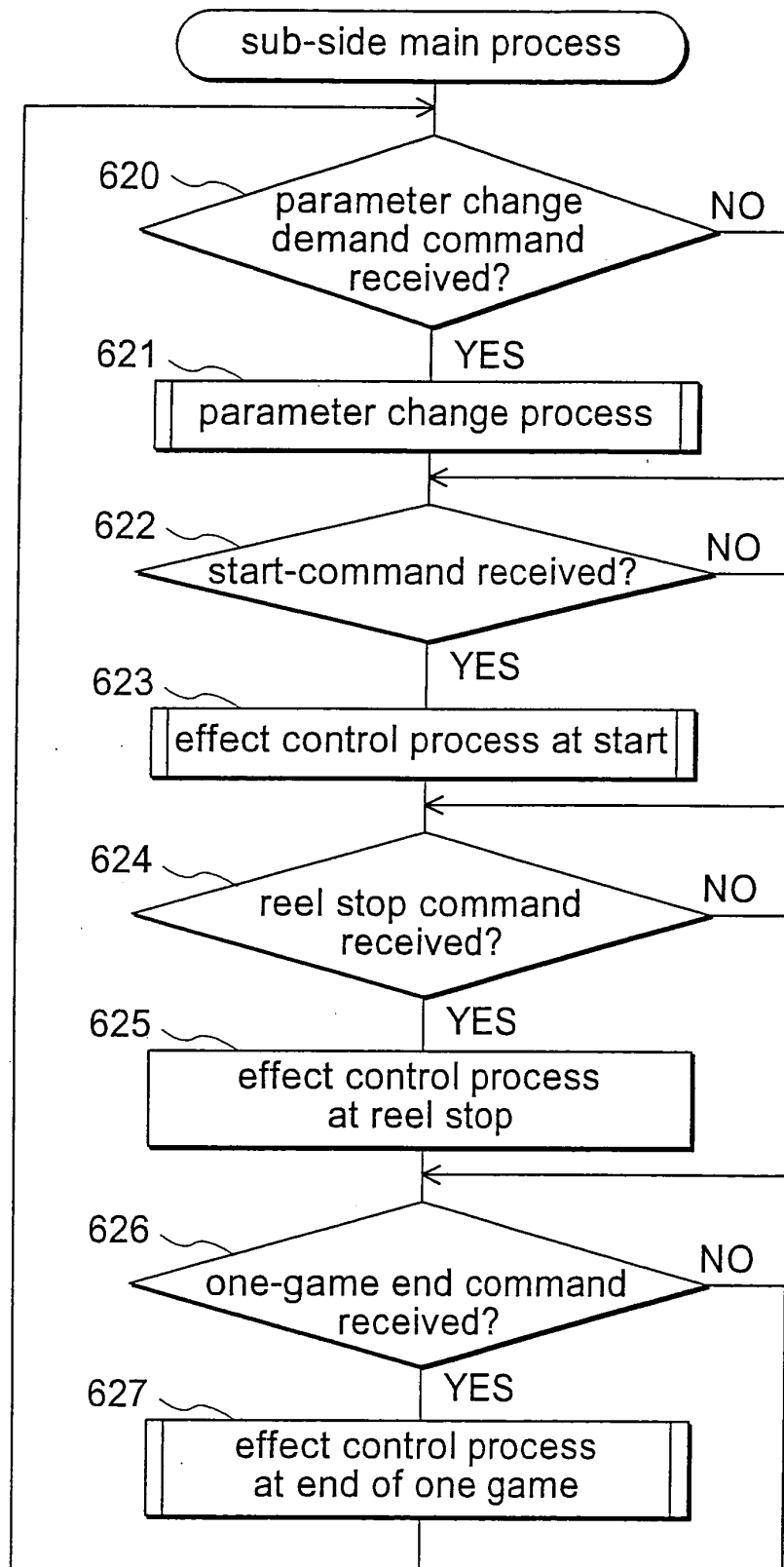


Fig. 33

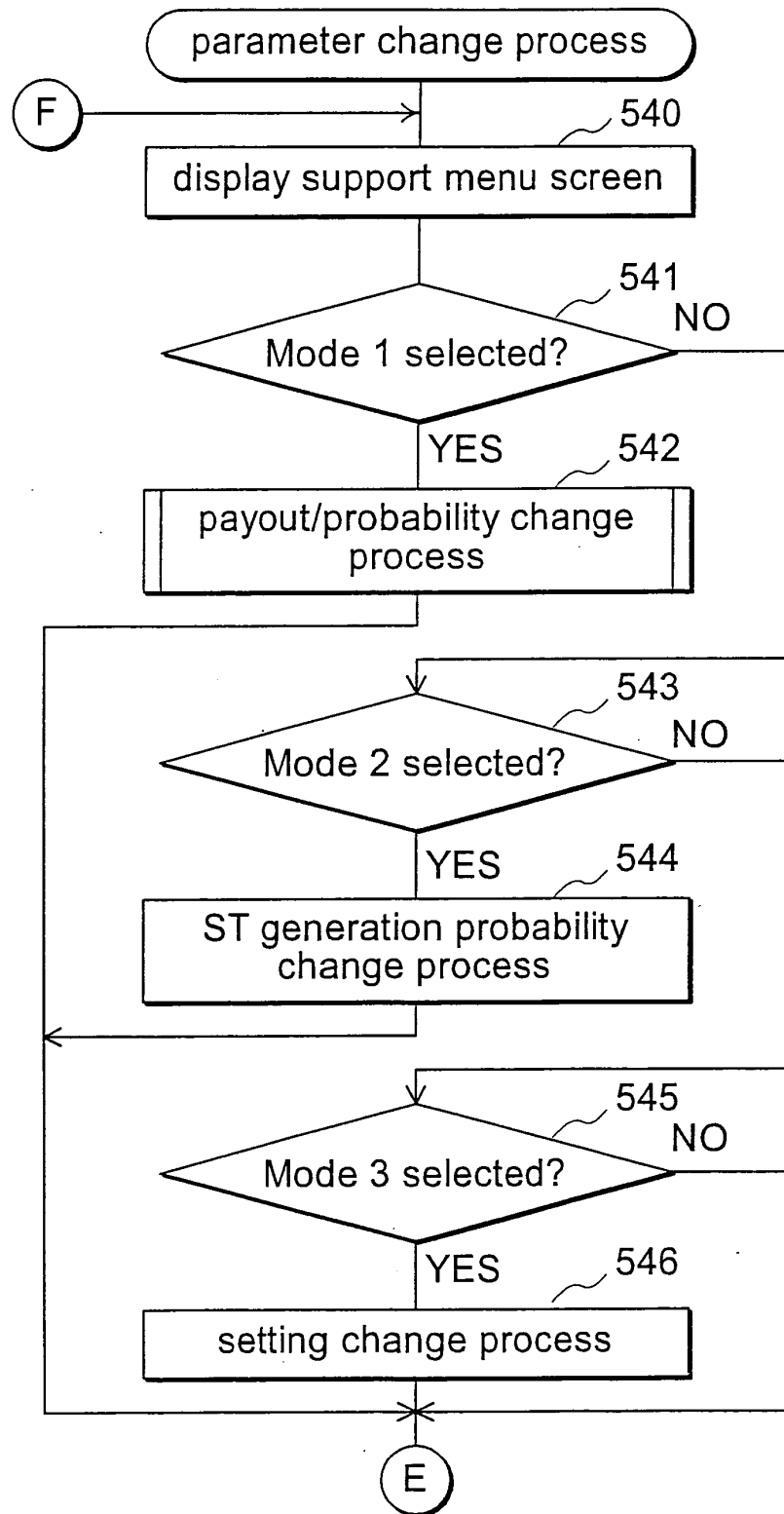


Fig. 34

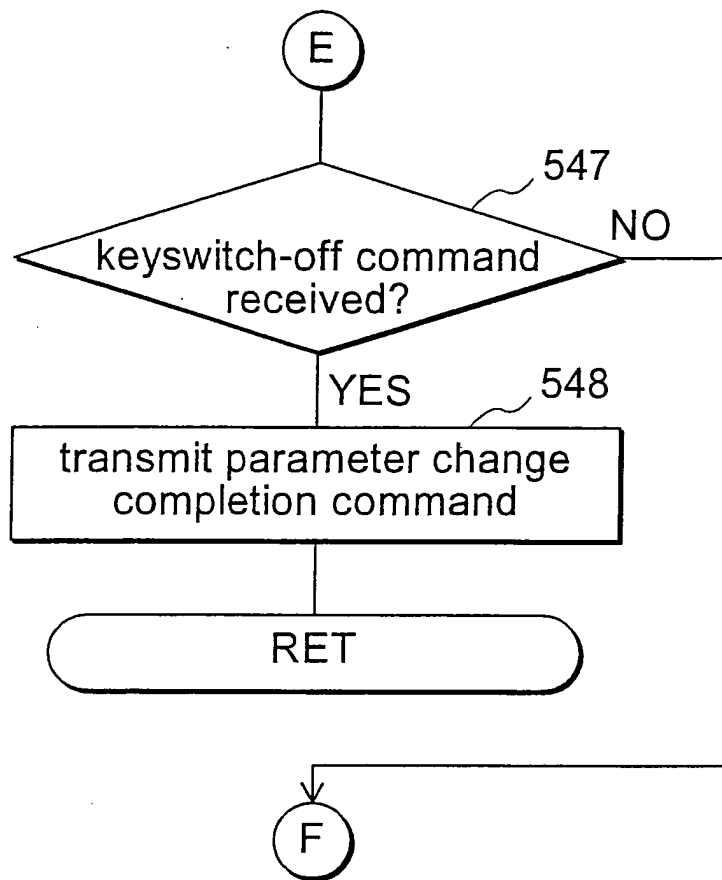


Fig. 35

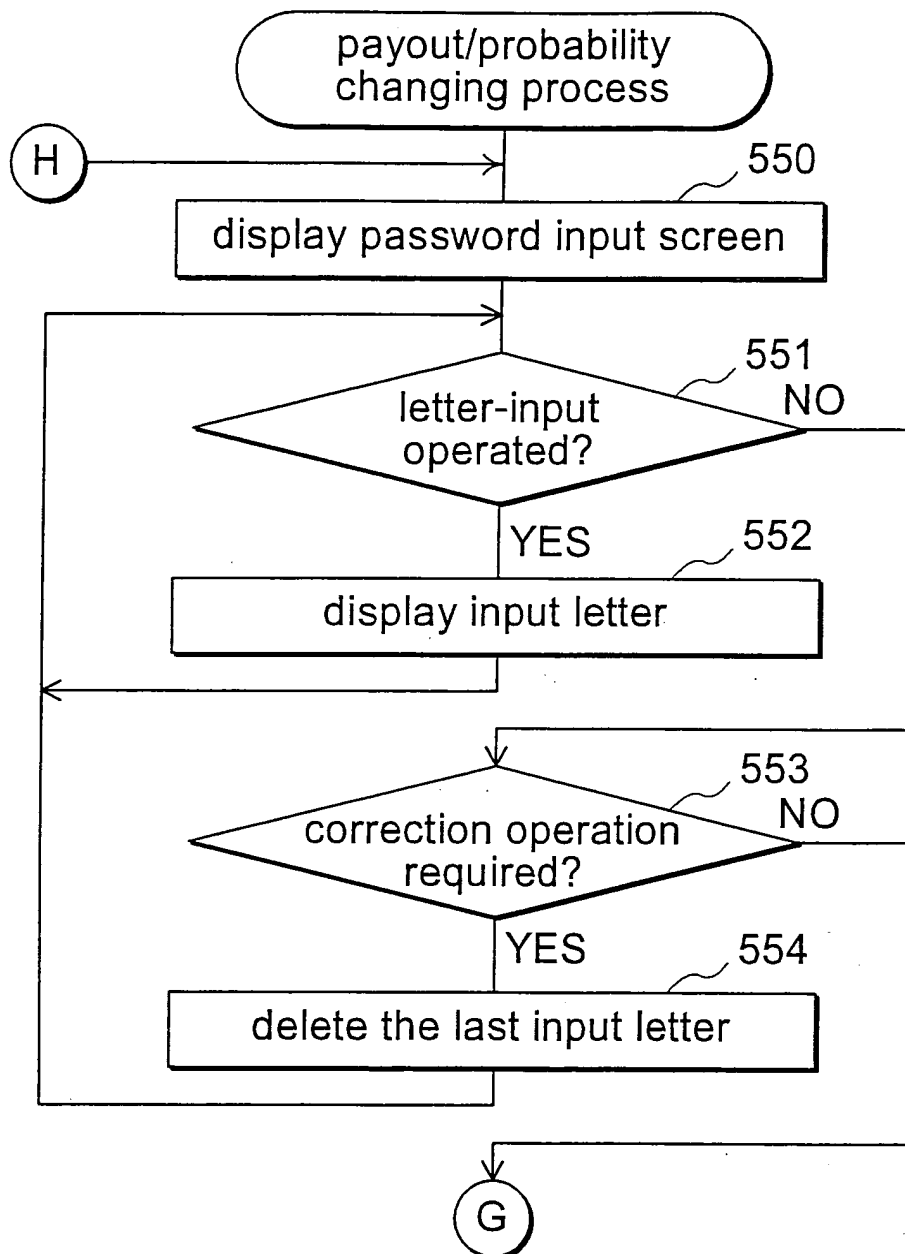


Fig. 36

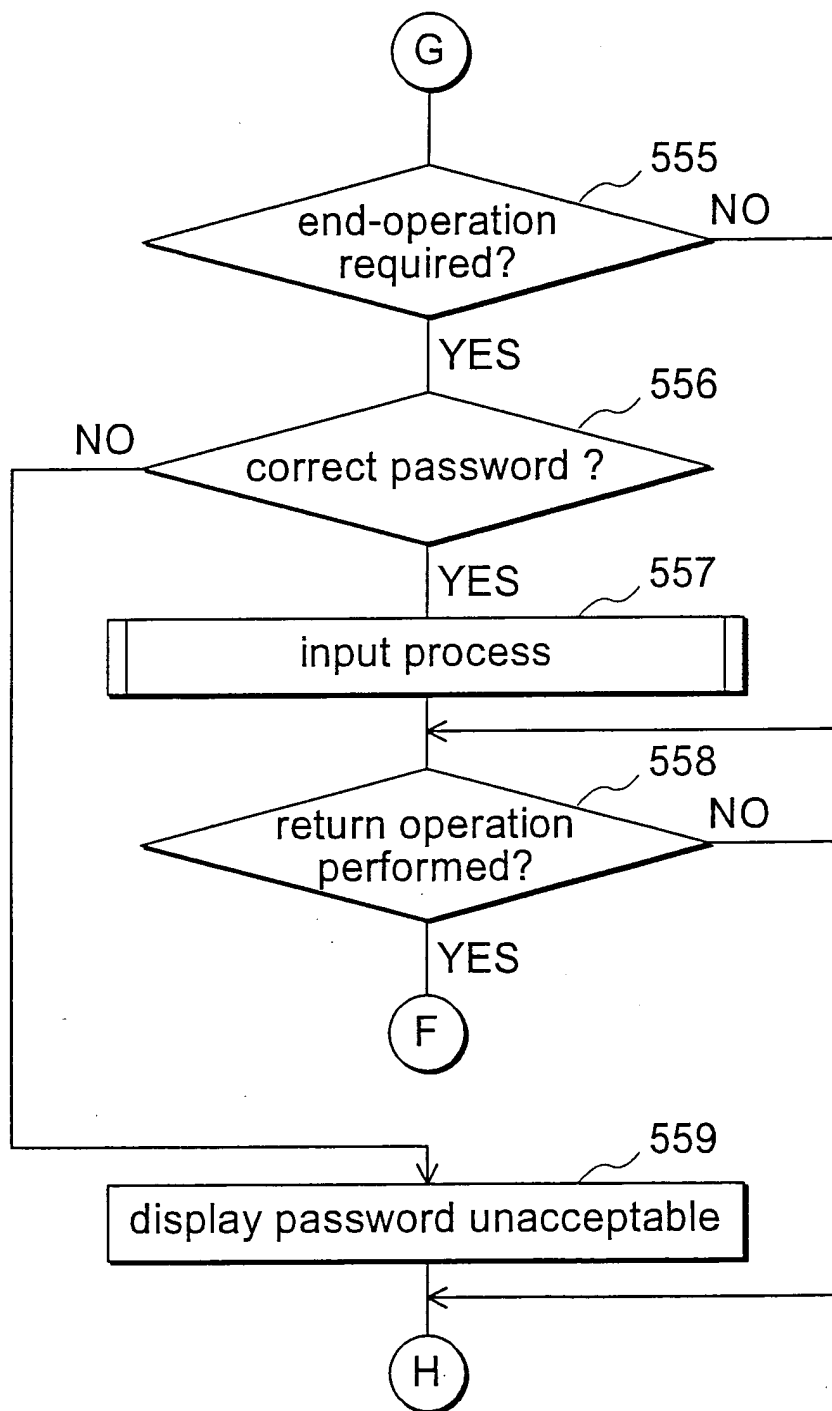


Fig. 37

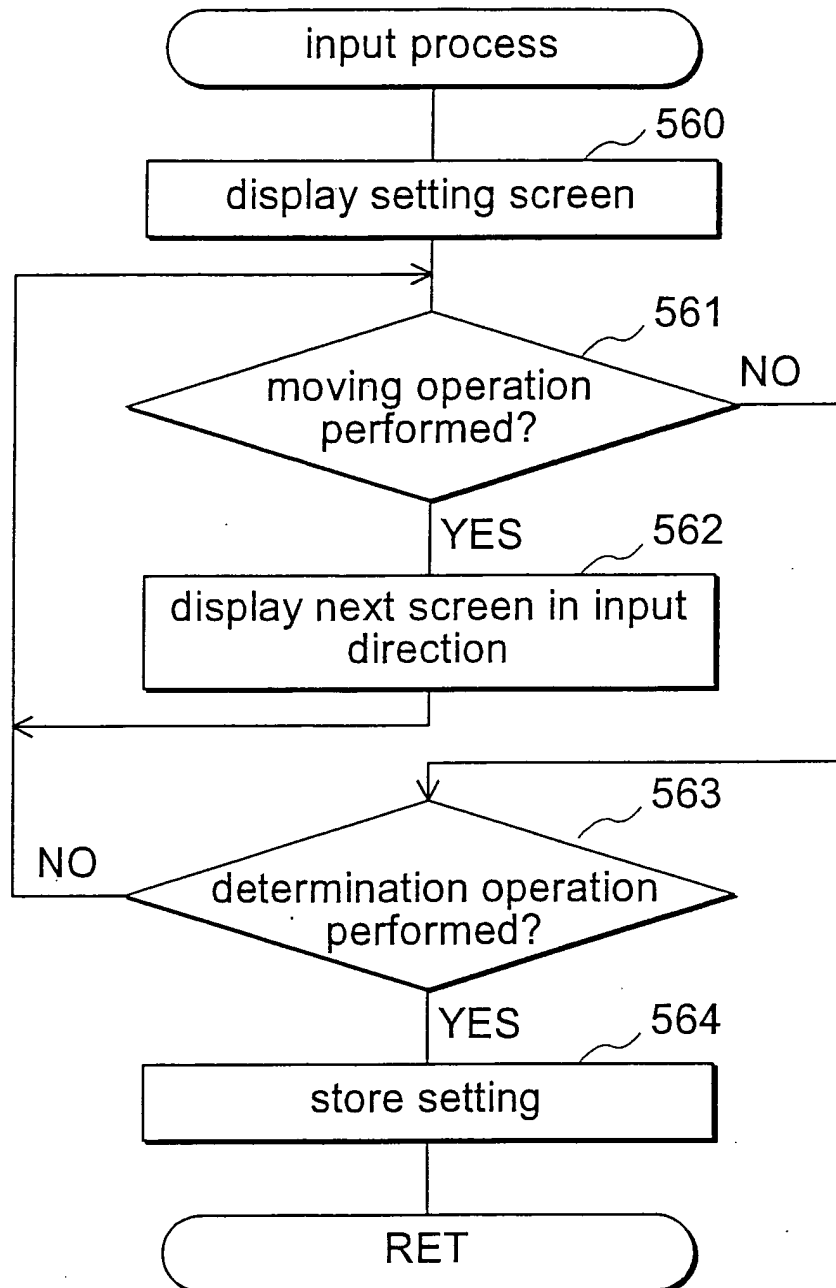


Fig. 38

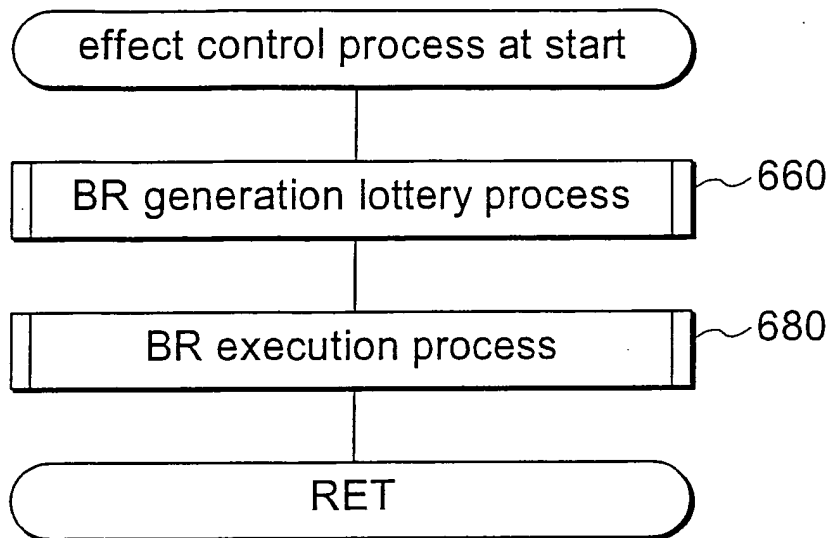


Fig. 39

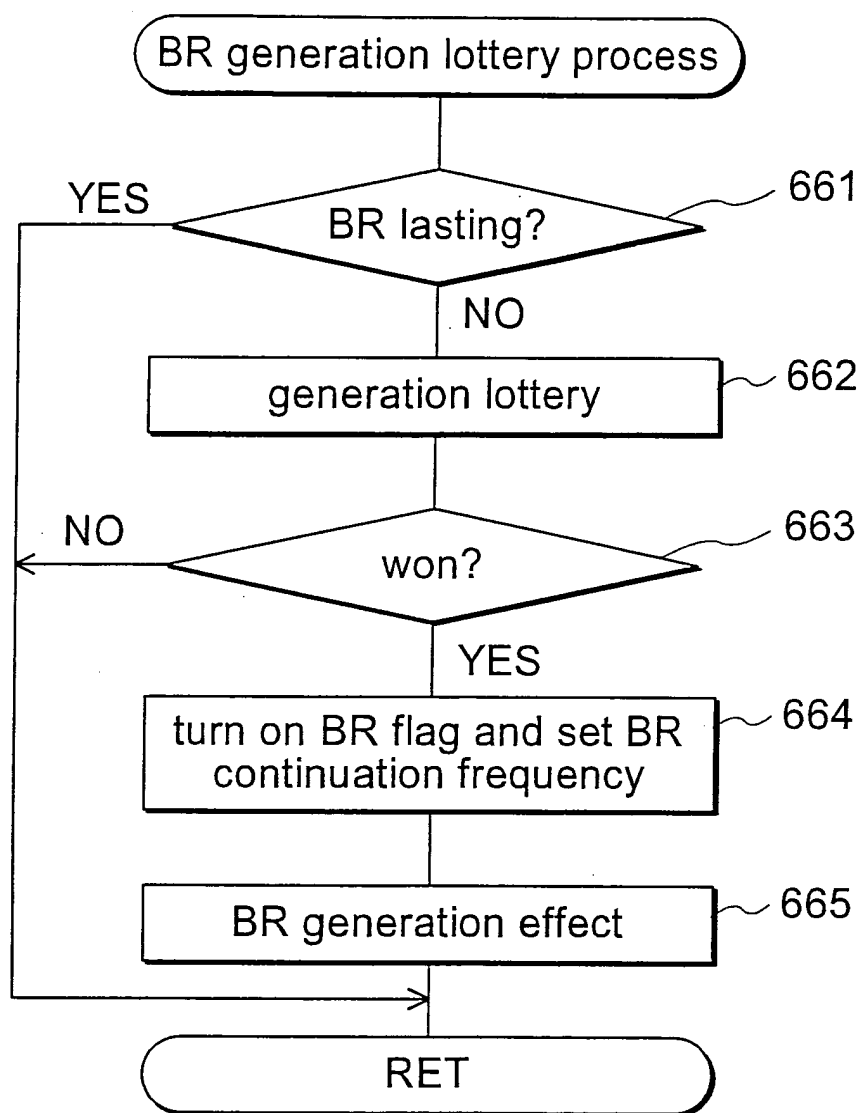


Fig. 40

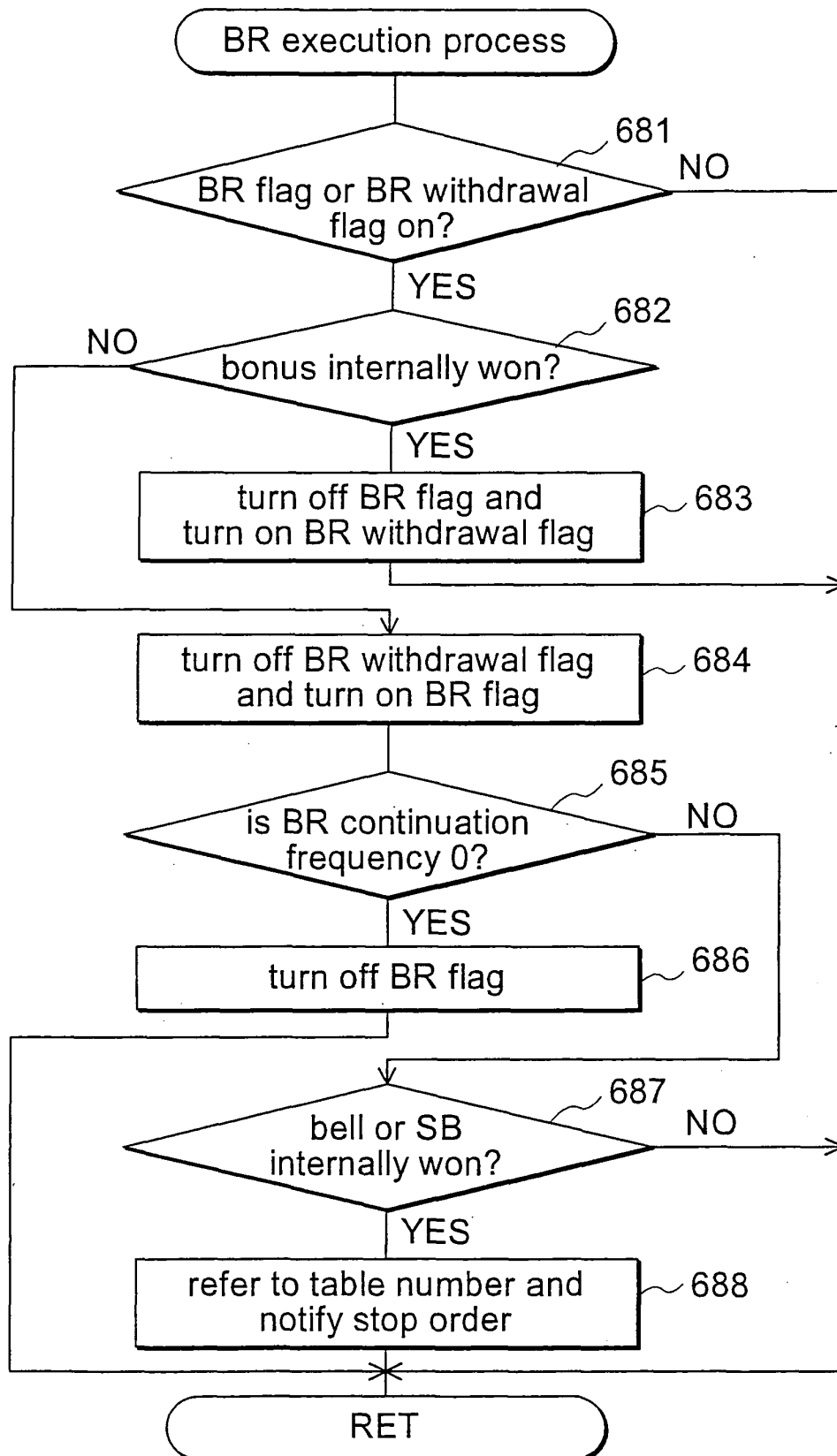


Fig.41

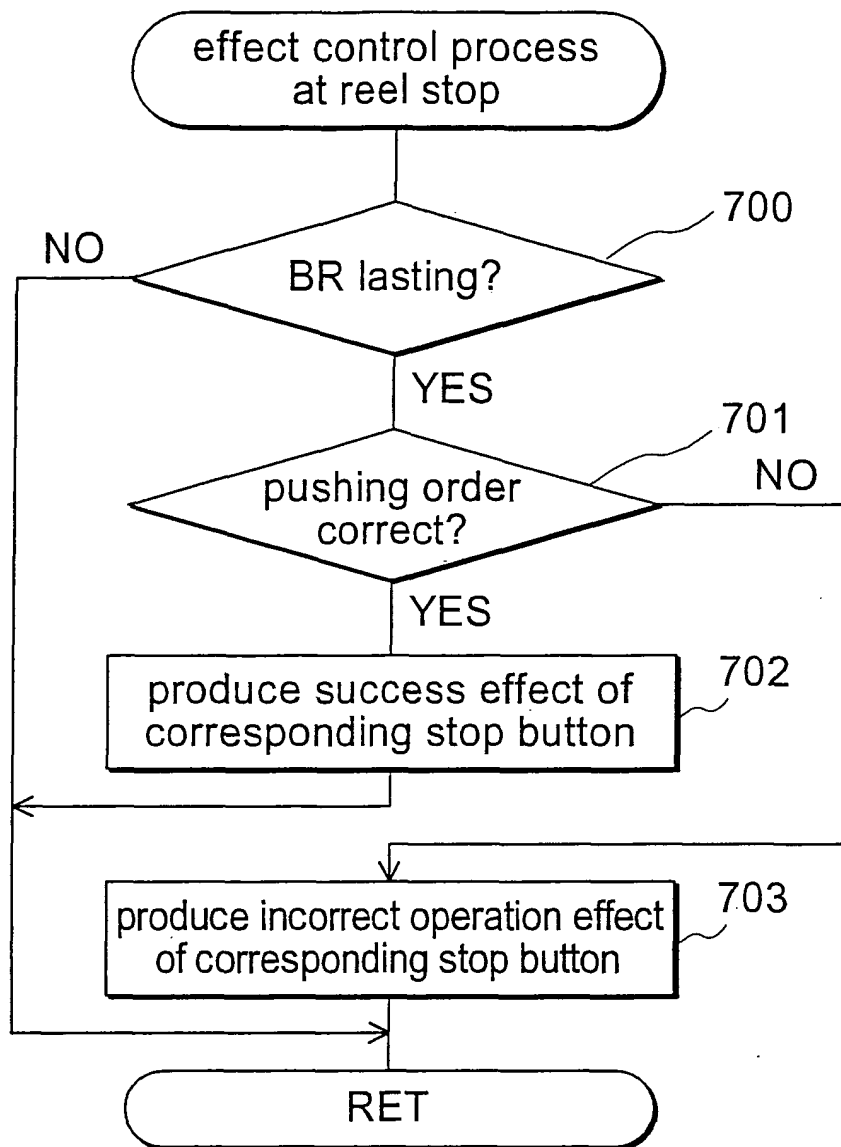


Fig. 42

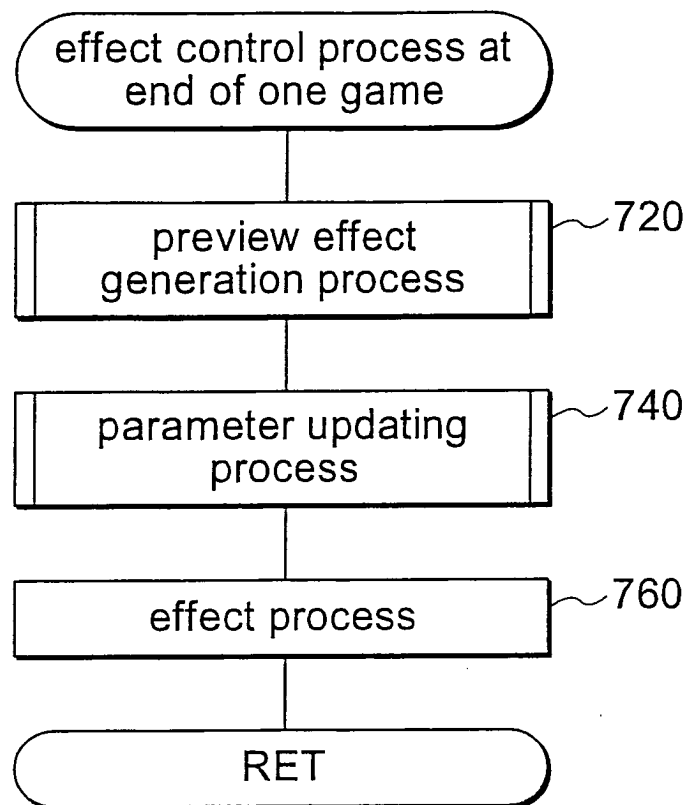


Fig. 43

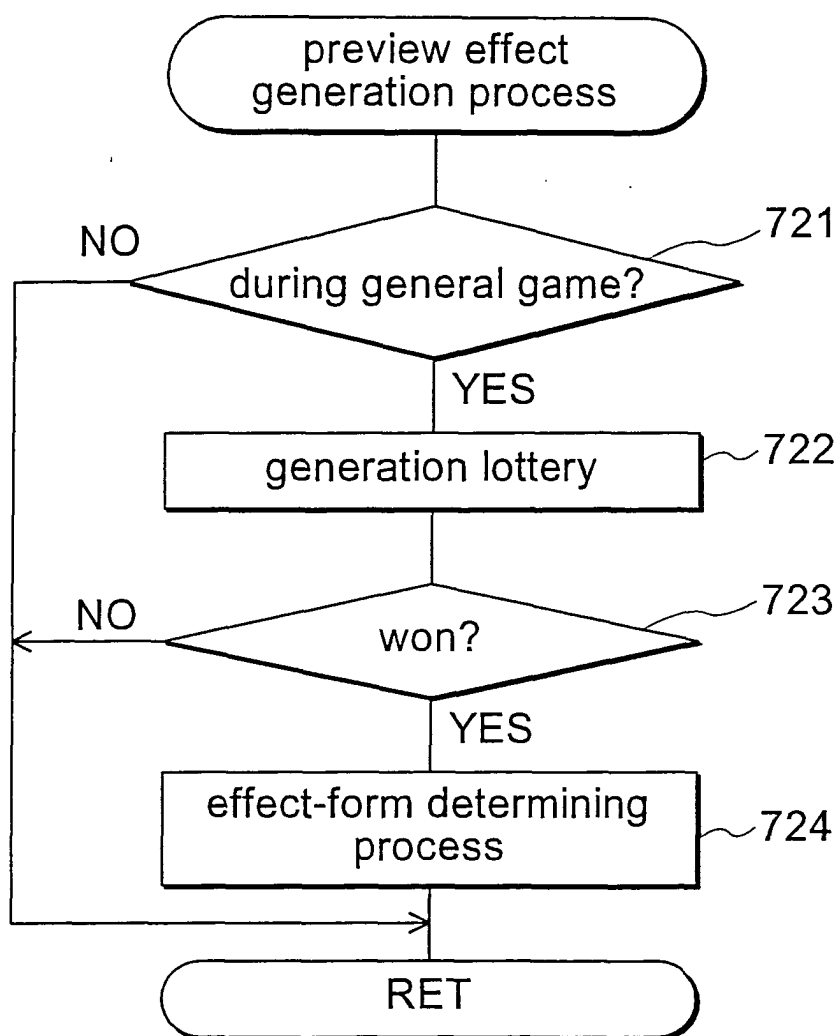


Fig. 44

