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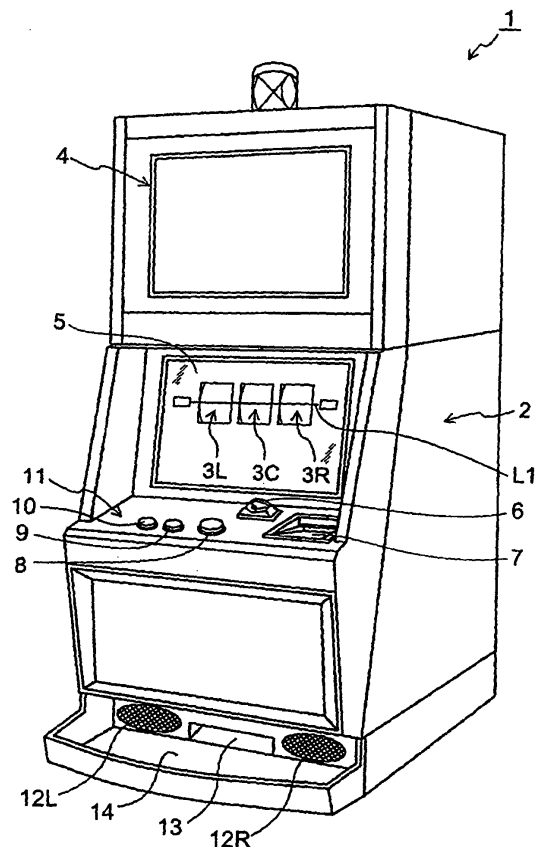
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(54) **Gaming machine**

(57) The gaming machine in accordance with the present invention comprises first and second display means for displaying an image; display control means for controlling the display of the first and second display means; and touch input means for inputting input information corresponding to a touch position of a finger. In this gaming machine, after the game shifts from a base game to a bonus game, a gaming image including a help operation key image for displaying a gaming explanation image concerning a gaming content in the bonus game is displayed by the first display means, and the gaming explanation image is displayed by the second display means when the input information corresponding to the help operation key image is fed from the touch input means.

Fig.1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a gaming machine having a function of displaying explanation concerning contents of a game.

Related Background Art

[0002] There have conventionally been many gaming machines having a function (which will also be referred to as "help function" in the following) of providing players who are not accustomed to gaming operations such as beginners in particular with explanations concerning gaming contents (the gaming being also referred to as "game" in the following).

[0003] Known as an example of such gaming machines is one disclosed in Japanese Patent Application Laid-Open No. 2002-191753 (hereinafter referred to as "Patent Document 1"). The gaming machine disclosed in Patent Document 1 is a so-called slot machine, which comprises a reel performing variable displays by rotating or scrolling, and a liquid crystal display device. This gaming machine can display explanations concerning gaming contents on the liquid crystal display device while a slot game is being played. Players can display explanations concerning gaming contents or select their wanted explanations by operating a cross key disposed near the liquid crystal display device (which will also be referred to as "help operation"). There have also been gaming machines in which a liquid crystal display device is provided with a touch panel, so that the help operation is performed by operations on the touch panel.

SUMMARY OF THE INVENTION

[0004] In the conventional gaming machines such as the one disclosed in the above-mentioned Patent Document 1, however, it is troublesome for players to perform the help operation with the cross key provided near the liquid crystal display device or touch panel while proceeding with games. When a time limit is set for operations for proceeding with games or the like in particular, it is quite difficult for players to perform the help operation while proceeding with the games.

[0005] In view of the problems inherent in the above-mentioned prior art, it is an object of the present invention to provide a gaming machine which can easily carry out an operation for acquiring explanations concerning gaming contents while proceeding with game.

[0006] For achieving the above-mentioned object, the present invention provides a gaming machine comprising first display means and second display means for displaying an image; display control means for controlling the display of the first and second display means;

shift determining means for determining whether a shift condition for shifting a game from a base game to a bonus game is satisfied or not; and shifting means for shifting the game from the base game to the bonus game according to a result of determination by the shift determining means; the gaming machine further comprising touch input means, disposed in front of the first display means, for inputting input information corresponding to a touch position of a finger; wherein, after the shifting means shifts the game to the bonus game, the display control means causes the first display means to display a gaming image including a help operation key image for displaying a gaming explanation image concerning a gaming content in the bonus game, and causes the second display means to display the gaming explanation image when the input information corresponding to the help operation key image is fed from the touch input means.

[0007] Since a gaming image including a help operation key image for displaying a gaming explanation image concerning a gaming content in a bonus game is displayed in the first display means in the present invention, operations for acquiring explanations concerning gaming contents can easily be carried out while seeing gaming images during gaming.

[0008] The display control means may display as the gaming image an image including a gaming operation image for performing a gaming operation in the bonus game.

[0009] This allows an image including a gaming operation image to be displayed as the gaming image, whereby players can perform an input operation while seeing the gaming operation image in the bonus game, and thus can easily carry out an operation for acquiring explanations concerning gaming contents even during proceeding with game.

[0010] In this case, the gaming machine may further comprise operation deactivating means by which, in first and second game operations sequentially performed by a player with the gaming operation image, the second game operation is deactivated after a predetermined period from the first game operation.

[0011] When a time limit is set for such an operation with a gaming operation image, operations for acquiring explanations concerning gaming contents can be performed quickly in the present invention, whereby affects on the proceeding with game can be reduced, and the fun of gaming can be maintained.

[0012] The present invention will be more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not to be considered as limiting the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is a perspective view showing the overall configuration of a gaming machine which is the gaming machine in accordance with an embodiment of the present invention;

Fig. 2 is a front view showing a lower image display of the gaming machine shown in Fig. 1;

Fig. 3 is a perspective view showing a configuration of reels;

Fig. 4 is a perspective view showing one of the reels shown in Fig. 3;

Fig. 5 is a perspective view showing a schematic configuration of a liquid crystal display device as seen from the backside of a cabinet;

Fig. 6 is an exploded perspective view of a part of the liquid crystal display device;

Fig. 7 is a block diagram of the gaming machine focused on its internal configuration;

Fig. 8 is a block diagram showing an image control circuit;

Fig. 9 is a flowchart showing an operation procedure of a main process from the start to end of a game in the gaming machine;

Fig. 10 is a flowchart showing an operation procedure of the lottery process shown in Fig. 9;

Fig. 11 is a flowchart showing an operation procedure of a base game process;

Fig. 12 is a chart showing an example of contents of a stop table;

Fig. 13 is a view showing an example of state where the reels are stopped in the base game process;

Fig. 14 is a view showing an example of the lower image display when performing a bonus game;

Fig. 15 is a view showing an example of the upper image display when performing a bonus game;

Fig. 16 is a view showing an example of the upper image display when a help key is pressed;

Fig. 17 is a view showing an example of tile images;

Fig. 18A is a view showing a step of proceeding with a tile game, whereas Fig. 18B is a view showing a step subsequent to Fig. 18A;

Fig. 19A is a view showing a step subsequent to Fig. 18B, whereas Fig. 19B is a view showing a step subsequent to Fig. 19A;

Fig. 20 is a flowchart showing an operation procedure of the tile game;

Fig. 21 is a flowchart showing an operation procedure of a tile arranging process; and

Fig. 22 is a flowchart showing an operation procedure of another tile game.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] In the following, preferred embodiments of the

present invention will be explained in detail with reference to the accompanying drawings. In the explanation of the drawings, constituents identical or equivalent to each other will be referred to with numerals identical to each other without repeating their overlapping descriptions.

[0015] In the embodiments, a case where the present invention is applied to a gaming machine having variable display means for variably displaying symbols will be explained while taking the following gaming machine 1 by way of example. This gaming machine 1 performs different kinds of gaming whose contents differ from each other, i.e., the first game for variably displaying a plurality of symbols and the second game for displaying tile images showing a plurality of tiles stepwise subsequent to the first game. Also, the gaming machine 1 is a coin insertion type gaming machine which requires a coin to be inserted for starting the gaming.

Overall Configuration of Gaming machine

[0016] Fig. 1 is a perspective view showing the overall configuration of the gaming machine 1. The gaming machine 1 is a gaming machine in accordance with an embodiment of the present invention, and includes variable display means which variably displays a plurality of symbols and allows a slot game using the variable display of a plurality of symbols to be played. The slot game is the first game.

[0017] The gaming machine 1 includes an upper image display 4 and a lower image display 5 successively arranged from the upper side in front of a cabinet 2. The upper image display 4 includes a help display section 4e, which will be explained later, and constitutes the second display means in the present invention, thereby displaying a gaming explanation image concerning gaming contents, which will be explained later. The lower image display 5 displays a gaming image, and constitutes the first display means in the present invention. The lower image display 5 is disposed at substantially the vertical center of the cabinet 2, whereas three mechanical reels 3L, 3C, 3R are arranged rotatably in a horizontal row within the cabinet 2 so as to correspond to the lower image display 5.

[0018] The reels 3L, 3C, 3R can be seen from the outside through symbol display windows 21L, 21C, 21R of the lower image display 5, which will be explained later. As will later be explained in detail, the reels 3L, 3C, 3R have respective outer peripheries each illustrated with symbol columns having a plurality of kinds of symbols (not depicted), thereby constituting variable display means which are rotatable such that the symbols are displayed variably, each rotating at a fixed speed (e.g., 80 rpm).

[0019] The symbol display windows 21L, 21C, 21R are provided with a horizontally extending pay line L1 so as to correspond to the reels 3L, 3C, 3R as shown in Fig. 2. Though not depicted, upper and lower pay lines

may separately be provided in addition to the pay line L1, and two oblique lines may further be provided. When a plurality of pay lines are provided, it will be preferred if the number of lines varies depending on the number of coins inserted. In this case, the pay lines become individually active in response to the number of inserted coins and operations of BET switches 9, 10 which will be explained later. The active pay lines are referred to as activated lines or pay lines as well. For example, only the center pay line L1 becomes an activated line when a player inserts one coin into a coin insertion slot 6 which will be explained later, the upper and lower pay lines become active in addition to the pay line L1 when two coins are inserted, and all the pay lines become active when three coins are inserted. Though Fig. 2 shows a state where symbols are stopped only on the pay line L1 for easier viewing, each of the symbol display windows 21L, 21C, 21R usually displays three symbols in a vertical row.

[0020] In the gaming machine 1, a substantially horizontal base portion 11 is disposed under the lower display 5. The base portion 11 is provided with the coin insertion slot 6, a bill insertion slot 7, a spin switch 8, a 1-BET switch 9, and a maximum BET switch 10.

[0021] The coin insertion slot 6 is provided in order for a player to insert coins for betting on games, and includes an inserted coin sensor 6a (see Fig. 7) for outputting a signal indicative of the coin insertion. The bill insertion slot 7 is provided in order for the player to insert bills, and includes an inserted bill sensor 7a (see Fig. 7) for outputting a signal indicative of the bill insertion. The spin switch 8 is provided in order for the player to perform an operation for starting a variable display of symbols by rotating the reels 3L, 3C, 3R within the respective symbol display windows 21L, 21C, 21R, i.e., an operation for starting a game. The 1-BET switch 9 is provided for activating a setting for betting one coin by one operation. The maximum BET switch 10 is provided for activating a setting for betting the maximum number of coins that can be bet on one game by one operation.

[0022] At the bottom part of the cabinet 2, the gaming machine 1 is provided with a coin payout opening 13 and a coin receiving tray 14 for collecting the paid-out coins. Further, speakers 12L, 12R are disposed on the left and right sides of the coin payout opening 13, respectively.

Explanation of Image Display Sections

[0023] As shown in Fig. 2, the lower image display 5 includes the symbol display windows 21L, 21C, 21R; frame display windows 22L, 22C, 22R; and an effect image display area 5a. Contents displayed on the lower image display 5 vary depending on the variable display mode and stop mode of the reels 3L, 3C, 3R and contents of actions of a liquid crystal display device 41 which will be explained later. The lower image display 5 is also provided with a BET number display section 16, a pay-

out display section 18, a credit display section 19, etc., which are not depicted in Fig. 2.

[0024] The symbol display windows 21L, 21C, 21R are provided so as to correspond to the reels 3L, 3C, 3R, respectively, and are areas for displaying the symbols illustrated on the reels 3L, 3C, 3R in a recognizable fashion. When the reels 3L, 3C, 3R are in a rotating state or their rotation is stopped, their corresponding symbol display windows 21L, 21C, 21R are displayed in a transparent fashion such that the symbols illustrated on the reels 3L, 3C, 3R being scrolled by the player are recognizable, whereas effect images by still images and moving images, e.g., symbols, letters, figures, marks, and characters, are not displayed.

[0025] The frame display windows 22L, 22C, 22R are disposed so as to surround their corresponding symbol display windows 21L, 21C, 21R, and function as respective display windows for the symbols illustrated on the reels 3L, 3C, 3R.

[0026] The effect image display area 5a displays images indicating explanations concerning gaming contents, information allowing players to proceed with the gaming advantageously, and effect image for enhancing the joy of gaming.

[0027] The upper image display 4 changes its contents of display depending on contents of operations of a liquid crystal display device 140 which will be explained later.

Configuration of Reels

[0028] As shown in Fig. 3, the reels 3L, 3C, 3R, each being freely rotatable, are arranged in a horizontal row and have the same configuration. As shown in Fig. 4, the reel 3L comprises a cylindrical frame in which two annular frames 25, 26 having the same form are arranged with a predetermined gap therebetween, and are connected to each other by a plurality of connecting members 27. The reel 3L includes a transmission member 28 for transmitting the driving force of a stepping motor M1 (see Fig. 7) disposed at the center part of the cylindrical frame to the annular frames 25, 26 as shown in Fig. 4, while a reel sheet which is not depicted is attached to a side face part so as to cover the connecting members 27. The reel sheet is illustrated with a plurality of symbols. Though symbols such as those in a stop table 90 shown in Fig. 12 which will be explained later are assumed to be the symbols in the reel sheet here, they are not restrictive as a matter of course. Though not depicted, the reels 3L, 3C, 3R may be provided with an LED-accommodating circuit board and an LED lamp on the backside of horizontal three rows each of symbols appearing in the symbol display windows 21L, 21C, 21R (nine in total) when the reels 3L, 3C, 3R are stopped, respectively. This allows the LED lamp to emit white light from the backside of the reel sheet, so as to illuminate the lower image display 5, thereby representing gaming contents by devising the way of illumination.

Explanation of Liquid Crystal Display Device

[0029] The liquid crystal display device 41 constituting the lower image display 5 will now be explained with reference to Figs. 5 and 6. Fig. 5 is a perspective view showing a schematic configuration of the liquid crystal display device 41 as seen from the backside of the cabinet 2. Fig. 6 is an exploded perspective view of a part of the liquid crystal display device 41.

[0030] The liquid crystal display device 41 is disposed in front of the reels 3L, 3C, 3R while being separated therefrom by a predetermined distance and extending thereover. The liquid crystal display device 41 comprises a protective glass sheet 42; a display plate 43; a liquid crystal panel 44; a lightguide plate 45; a reflecting film 46; fluorescent lamps 47a, 47b, 48a, 48b which are white light sources; lamp holders 49a to 49h; and a flexible substrate (not depicted) which is connected to a terminal part of the liquid crystal panel 44 and constituted by a table carrier package (TCP) mounted with an IC for driving the liquid crystal panel 44.

[0031] The protective glass sheet 42 and display plate 43 are transparent to light. The protective glass sheet 42 is mainly provided for protecting the liquid crystal panel 44. The display plate 43 is illustrated with a predetermined image which is not depicted.

[0032] The liquid crystal panel 44 is constituted by a transparent substrate such as a glass sheet formed with a thin-film transistor, a transparent substrate opposing the above-mentioned transparent substrate, and a liquid crystal sealed between them, and forms the symbol display windows 21L, 21C, 21R. The liquid crystal panel 44 is configured normally white such that it displays white (light is transmitted on the display surface side and visible from the outside) in a state where no voltage is applied to the liquid crystal (the liquid crystal is not driven), whereby the reels 3L, 3C, 3R are visible from the front side. When the liquid crystal panel 44 configured normally white as such is provided, even if the sealed liquid crystal cannot be driven, the symbols illustrated on the reels 3L, 3C, 3R can be seen through the symbol display windows 21L, 21C, 21R, whereby the player can play gaming while seeing the variable displays and stop displays of the reels 3L, 3C, 3R.

[0033] The lightguide plate 45 is transparent to light, and is disposed on the backside of the liquid crystal panel 44 in order to guide the light from the fluorescent lamps 47a, 47b to the liquid crystal panel 44.

[0034] The reflecting film 46 is provided in order to reflect the light introduced to the lightguide plate 45 toward the front face of the lightguide plate 45, and is constituted by a white polyester film or aluminum thin film and a silver deposition film formed thereon. The reflecting film 46 includes a reflecting area 46A and a nonreflecting areas 46BL, 46BC, 46BR. The nonreflecting areas 46BL, 46BC, 46BR are made of a transparent material, and are formed as a light-transmitting part which transmits incident light therethrough without reflecting it. The

nonreflecting areas 46BL, 46BC, 46BR are formed so as to correspond to the symbol display windows 21L, 21C, 21R, and are each disposed in front of three symbols arranged in a vertical row appearing when their corresponding reels 3L, 3C, 3R are stopped. The reflecting area 46A reflects the incident light, and acts as illuminating means mainly for regions corresponding to the frame display windows 22L, 22C, 22R and effect image display area 5a in the area of the liquid crystal panel 44.

[0035] The fluorescent lamps 47a, 47b are disposed along upper and lower end parts of the lightguide plate 45, and their both ends are supported by their corresponding lamp holders 49a, 49b, 49g, 49h. The fluorescent lamps 47a, 47b generate light to be introduced into the lightguide plate 45, and acts as illuminating means mainly for regions corresponding to the frame display windows 22L, 22C, 22R and effect image display area 5a in the area of the liquid crystal panel 44.

[0036] The fluorescent lamps 48a, 48b are disposed so as to be directed to the reels 3L, 3C, 3R at upper and lower positions on the backside of the reflecting film 46. Namely, the light emitted from the fluorescent lamps 48a, 48b is reflected by the surfaces of the reels 3L, 3C, 3R, so as to be made incident on the nonreflecting areas 46BL, 46BC, 46BR, thus illuminating the liquid crystal panel 44. Therefore, the fluorescent lamps 48a, 48b act as illuminating means for the symbols disposed on the reels 3L, 3C, 3R, and illuminating means for regions corresponding to the symbol display windows 21L, 21C, 21R in the reflecting film 46.

[0037] The liquid crystal display device 140 has the same configuration as that of the liquid crystal display device 41 except that a touch panel 56 which will be explained later is not disposed in front and that the reels 3L, 3C, 3R are not disposed on the backside.

Internal Configuration of Gaming machine

[0038] Fig. 7 is a block diagram of the gaming machine 1 focused on its internal configuration. The gaming machine 1 comprises a plurality of constituents centered at a control board 71 including a microcomputer 31. The control board 71 comprises the microcomputer 31, a random number generator 35, a sampling circuit 36, a clock pulse generating circuit 37, a divider 38, a hopper driving circuit 63, a payout completion signal circuit 65, a display section driving circuit 67, a sound generating IC 78, a power amplifier 79, and an image control circuit 81.

[0039] The microcomputer 31 comprises a CPU (Central Processing Unit) 32, a RAM (Random Access Memory) 33, and a ROM (Read Only Memory) 34. The CPU 32 operates as various means characterizing the present invention according to programs stored in the ROM 34, and inputs/outputs signals from/to other constituents by way of an I/O port 39, thereby controlling operations of the gaming machine 1 as a whole. The RAM 33 stores data and programs used when the CPU

32 operates. For example, the RAM 33 temporarily holds a random number value sampled by the sampling circuit 36, which will be explained later, after a game is started, and stores code numbers of the reels 3L, 3C, 3R and symbol numbers. The ROM 34 stores programs executed by the CPU 32, and permanent data.

[0040] The random number generator 35 operates as instructed by the CPU 32, so as to generate random numbers within a fixed range. As instructed by the CPU 32, the sampling circuit 36 samples a given random number from among the random numbers generated by the random number generator 35, and feeds thus sampled random number to the CPU 32. The clock pulse generating circuit 37 generates a reference clock for actuating the CPU 32, whereas the divider 38 feeds the CPU 32 with a signal obtained when dividing the reference clock by a predetermined period.

[0041] A reel driving unit 50 is connected to the control board 71. The reel driving unit 50 includes a reel position detecting circuit 51 for detecting respective positions of the reels 3L, 3C, 3R, and a motor driving circuit 52 for feeding driving signals to motors M1, M2, M3 for rotating the reels 3L, 3C, 3R, respectively. When the driving signals are inputted from the motor driving circuit 52, the motors M1, M2, M3 are actuated, so as to rotate the reels 3L, 3C, 3R, respectively. In addition, the spin switch 8, 1-BET switch 9, maximum BET switch 10, inserted coin sensor 6a, and inserted bill sensor 7a are connected to the control board 71, so that respective signals are inputted therefrom.

[0042] The hopper driving circuit 63 drives a hopper 64 under the control of the CPU 32. The hopper 64 performs an action for paying out coins, whereby the coins are paid out from the payout opening 13. The payout completion signal circuit 65 inputs coin number data from a coin detecting part 66 connected thereto and, when the number reaches a preset value, feeds the CPU 32 with a signal reporting that the payout of coins is completed. The coin detecting part 66 counts the number of coins paid out from the hopper 64, and feeds data of thus counted number to the payout completion signal circuit 65. The display section driving circuit 67 controls display operations of the individual display sections (BET number display section 16, payout display section 18, and credit display section 19).

[0043] The sound generating IC 78 inputs instructions from the CPU 32 and controls sound signals for outputting sounds from the speakers 12L, 12R. The power amplifier 79 inputs and amplifies the sound signals, so as to make the speakers 12L, 12R output the sounds. This allows the speakers 12L, 12R to output sounds, for example, for enhancing the joy of a game at an appropriate period after starting the game.

[0044] Also, the touch panel 56 is connected to the CPU 32. The touch panel 56 is the touch input means in the present invention, and is disposed so as to cover the front face of the protective glass sheet 42 in front of the lower image display 5. The touch panel 56 detects

a position (touch position) touched by a contact body such as a finger of a player, and feeds the CPU 32 with information (corresponding input information) corresponding to a help key (help operation key image) 120, which will be explained later, displayed on the lower image display 5 according to the touch position.

[0045] The image control circuit 81 controls respective image displays in the liquid crystal display devices 41, 101, such that the liquid crystal display devices 41 displays tile game images including a tile image 100, a board image 103, a give-up key 113, and the help key 120 characterizing the present invention, and that the liquid crystal display device 140 displays the help key 120, a point display section 4d, and the like which will be explained later.

[0046] As shown in Fig. 8, the image control circuit 81 includes an image control CPU 81a, a work RAM 81b, a program ROM 81c, an image ROM 81d, a video RAM 81e, and a VDP (Video Display Processor) 81f. In conformity to an image control program (concerning displays in the liquid crystal display devices 41, 101) stored in the program ROM 81c beforehand according to parameters set by the microcomputer 31, the image control CPU 81a determines images to be displayed on the liquid crystal display devices 41, 101. The work RAM 81b is constructed as temporary storage means when the image control CPU 81a executes the image control program.

[0047] The program ROM 81c stores the image control program, various selection tables, etc. The image ROM 81d stores dot data for forming images. The video RAM 81e is constructed as temporary storage means used when images are formed by the VDP 81f. The VDP 81f includes a control RAM 81g, forms images in conformity to respective contents of displays on the liquid crystal display devices 41, 101 determined by the image control CPU 81a, and outputs thus formed images to the liquid crystal display devices 41, 101.

Contents of Operations of Gaming machine

[0048] Contents of operations of thus configured gaming machine 1 will now be explained with reference to flowcharts shown in Figs. 9 to 11, 20, and 21. The gaming machine 1 in accordance with this embodiment includes a bonus game in addition to a base game. Though the base game is played, a bonus game advantageous to the player is performed when the game shifts to the bonus game. In the gaming machine 1, the base game is a slot game in which a plurality of symbols are variably displayed, whereas the bonus game is a tile game proceeding while arranging tile images. Namely, the slot game is played as the first game, whereas the tile game is played as the second game.

[0049] Fig. 9 is a flowchart showing an operation procedure of a main process from the start to end of a game in the gaming machine 1 as being divided into individual blocks. In Figs. 9 to 11, 20, and 21, steps are abbrevi-

ated as S.

[0050] In the gaming machine 1, the CPU 32 controls the proceeding with game. When the main process is started as shown in Fig. 9, the gaming machine 1 performs a start reception process at step 1, and a lottery process at step 2 subsequent thereto. Next, a base game process is performed at step 3 while the game is kept in the base game, and the flow proceeds to step 4. At step 4, in response to the lottery process at step 2, the CPU 32 operates as the shift determining means in the present invention, so as to determine whether a condition (shift condition) for shifting to a bonus game is satisfied or not. If the shift condition is satisfied here, the flow proceeds to step 5; otherwise, the main process ends. At step 5, the CPU 32 operates as the shifting means in the present invention, so as to shift the game to the bonus game, whereby a bonus game process is performed. Thereafter, the main process ends. In the following, details of the individual blocks will be explained.

[0051] First, at the start reception process of step 1, the gaming machine 1 under the control of the CPU 32 receives an operation for starting a game from a player. Since the gaming machine 1 is a coin insertion type gaming machine, for starting the game, the player initially inserts the number of coins to be bet on one game from the coin insertion slot 6, and operates the 1-BET switch 9 or maximum BET switch 10 when credit remains. Subsequently, the player operates the spin switch 8 (these operations being referred to as "starting operation" in the following). This starting operation feeds a start signal from the spin switch 8 to the CPU 32.

[0052] Next, at step 2, the lottery process is performed. When the lottery process is started, the flow proceeds to step 6 shown in Fig. 10, where the CPU 32 performs a symbol determining process. In the symbol determining process, the CPU 32 operates as symbol determining means, so as to determine respective symbols of the reels 3L, 3C, 3R to be stopped at the pay line L1. During the lottery process, the CPU 32 may instruct the image control circuit 81 to cause the liquid crystal display devices 41, 101 to show displays for representing the game.

[0053] In the lottery process, upon detecting the starting operation of the player by the start signal from the spin switch 8 (i.e., with the advent of the starting of the game), the CPU 32 instructs the random number generator 35 to generate random numbers within a fixed range. Also, the CPU 32 instructs the sampling circuit 36 to sample a given random number from among the random numbers generated by the random number generator 35. When the random number is sampled, the CPU 32 refers to an undepicted symbol determining table (table storing code numbers of symbols in association with the random numbers) stored in the ROM 34 while using the sampled random number as a search key, and acquires the code number of the corresponding symbol.

[0054] Next, setting thus acquired code number as a

search key, the CPU 32 refers to the stop table 90 shown in Fig. 12, and retrieves respective symbols displayed on the activated line when the reels 3L, 3C, 3R are stopped.

[0055] Here, as shown in Fig. 12, the stop table 90 is a table including a code number area 90a for storing code numbers (of symbols) and a symbol area 90b for storing respective symbols corresponding to the code numbers, so that, when the code number area 90a is searched through while setting a code number as a search key, corresponding symbols can be retrieved for the reels 3L, 3C, 3R. Individual symbols for the reels 3L, 3C, 3R are registered in association with code numbers of "0" to "10" in the symbol area 90b. For example, CI in Fig. 12 indicates a symbol combination in which all the acquired code numbers for the reels 3L, 3C, 3R are "0".

[0056] This gaming machine 1 performs three sets in total of the random number sampling and searching of the symbol determining table and stop table 90 for the reels 3L, 3C, 3R, respectively. Namely, the table search is carried out by the number corresponding to that of reels. When respective symbols are determined for the reels 3L, 3C, 3R, reel stopping positions for stopping these symbols at the pay line L1 are determined.

[0057] When the reel stopping positions are determined, the CPU 32 proceeds to step 7, and determines whether winning is attained or not by referring to a winning determining table stored in the ROM 34. The winning determining table registers any of winning symbol combinations and non-winning symbol combinations in association with combinations of code numbers (hereinafter referred to as "code number patterns") in a manner distinguishable from each other. Since a code number pattern corresponding to the reel stopping positions is determined at step 6, reference is made to the winning determining table while setting this code number pattern as a search key, and whether winning is attained or not is determined from the result of the reference.

[0058] Subsequently, the CPU 32 refers to a mode table, and performs a winning symbol arrangement determining process for determining a winning symbol arrangement (which will also be referred to as "winning combination"). The mode table is used for determining a mode of winning (winning symbol arrangement), and registers respective payout amount corresponding to individual winning symbol arrangements. Though not depicted, the mode table has the following contents in this embodiment. For example, a winning combination of "joker (symbol indicated by a in Fig. 12)" means a case where a specific symbol appears. When this symbol appears at the pay line L1, the game shifts to the bonus game, whereby a bonus game is played (for example, the symbol combination shown in Fig. 2 is displayed on the lower image display 5 at this time). "3BAR-3BAR-3BAR" in which three symbols each comprising vertically aligning three "BARs" (3BAR; symbol indicated by b in Fig. 12) align refers to a payout amount of 5. A winning

combination of "7-7-7" means that all the reels 3L, 3C, 3R attain the symbol of "7" (symbol indicated by c in Fig. 12), and is registered with a payout amount of 100 or the like.

[0059] Step 7 also determines the number of bonus games to be played when the result of determination is a bonus game (i.e., when the above-mentioned joker symbol appears). While the gaming machine 1 is adapted to play a tile game, which will be explained later, as the bonus game, the number of tile games to be played is determined at step 7. The lottery process ends with step 7.

[0060] After the lottery process ends, the flow proceeds to step 3 shown in Fig. 9, where a base game process which will be explained later is performed. Here, the reels 3L, 3C, 3R are rotated and then are stopped so as to correspond to the result of lottery at step 2, and coins are paid out according to the winning symbol arrangement when won. Next, at step 4, the CPU 32 determines whether a shift condition for shifting to a bonus game is satisfied or not from the result of the winning symbol arrangement determining process at step 7. When the winning symbol arrangement allows the shift to the bonus game, the flow proceeds to step 5, where a bonus game process is performed. Namely, the game progresses from a stage where the first game is played to a subsequent stage where the second game is played.

Bonus Game Process

[0061] In the gaming machine 1, a tile game is played as a bonus game. At this time, the CPU 32 actuates the image control circuit 81 and controls the proceeding with the tile game in conformity to a flow chart which will be explained later. In the tile game, tile game images including the board image 103 are displayed on the lower image display 5. The tile game proceeds along the flowcharts shown in Figs. 20 and 21. Here, Fig. 20 is a flowchart showing the procedure of the tile game process, whereas Fig. 21 is a flowchart showing the procedure of a tile arranging process.

[0062] Upon starting the tile game process, the CPU 32 proceeds to step 20 of the flowchart shown in Fig. 20, whereby tile game images are displayed as gaming images on the lower image display 5. At step 21 subsequent thereto, other tile game images are displayed on the upper image display 4. Then, an image (operation image) shown in Fig. 14 is displayed on the lower image display 5, whereas an image (various display image) shown in Fig. 15 is displayed on the upper image display 4. At step 22 subsequent thereto, the image control circuit 81 is instructed to display a tile arrangement request message (e.g., "Arrange A Tile At A Favorite Place") onto the lower image display 5. Then, the flow proceeds to step 23, where the tile arranging process is performed. After the completion of the tile arranging process, the tile game ends.

[0063] A tile game image displayed on the lower image display 5 includes the following constituents. Namely, this tile game image includes a board image 103 at the center, and a score display section 110, a line display section 111, and a give-up key (GIVE UP) 113 on the left side thereof. Arranged on the lower side of the board image 103 are a wager display section (WAGER) 114, a prize display section (WIN) 115, a payout display section (PAID) 116, and a credit (CREDIT) display section 117. Disposed on the right side of the board image 103 are a next tile display section (NEXT) 118, a point display section (POINT) 119, and a help key (HELP) 120 characterizing the present invention. The board image 103, the give-up key (GIVE UP) 113, and the image displayed on the next tile display section (NEXT) 118 constitute the gaming operation image in the present invention, and are displayed under the control of the CPU 32 operating as the display control means.

[0064] The board image 103 is an image showing an arrangement board (also referred to as arrangement plate) for the player to arrange tiles indicated by a tile image 100 which will be explained later, and includes a frame 101 forming an outer frame, and a game board 102 disposed therewithin and constituted by a plurality of tile plates 102a, 102b, 102c, ..., each acting as a site to place a tile.

[0065] The score display section 110 displays the total point acquired by the player, whereas the line display section 111 displays the number of completed lines which will be explained later.

[0066] The give-up key 113, which will later be explained in detail, allows the player to quit proceeding with a tile game when operated while playing the tile game. The give-up key 113 makes inputs active under a fixed condition, and changes (e.g., reverse black and white) its display when made active.

[0067] The wager display section 114, prize display section 115, payout display section 116, and credit display section 117 display respective amounts waged, won, paid out, and credited. The next tile display section 118 sequentially displays the tile images 100 of tiles to be arranged, which will be explained later, in conformity to the proceeding with game. The point display section 119 displays the point acquired by the player. The help key 120 is the help operation key image in the present invention, and is an operation key for causing a gaming explanation image, which will be explained later, to be displayed at the help display section 4e, which will be explained later, in the upper image display 4 when operated. Under the control of the CPU 32 operating as the display control means, the help key 120 is displayed on the lower image display 5.

[0068] In the tile game, the player refers to the tile game image, and repeatedly performs an operation (hereinafter referred to as "arrangement operation") in which a tile indicated by the tile image 100 in the next tile display section 118 is arranged at a desirable tile plate 102a, 102b, 102c, The tile game is game in

which a point is calculated from a tile group constituted by a plurality of tiles finally arranged on the game board 102.

[0069] On the other hand, the upper image display 4 comprises a title display section 4a for displaying a title, a effect image display section 4b for displaying an image for representing the tile game, and a total point display section 4c. Respective images of these display sections are displayed under the control of the CPU 32 operating as the display control means.

[0070] Then, at step 23 where the tile arranging process is started, the CPU 32 performs the process as follows according to the flowchart shown in Fig. 21.

[0071] After starting the process, the CPU 32 proceeds to step 31, so as to cause the next tile display section 118 to display the tile image 100 indicating a tile (hereinafter referred to as "arrangement tile") to be arranged on the game board 102 by the player.

[0072] Here, the tile image 100 is an image indicating a tile having a regular hexagon, which includes a vertical line 100a, a right oblique line 100b, and a left oblique line 100c as shown in Fig. 17. The vertical line 100a, right oblique line 100b, and left oblique line 100c are illustrated with numbers of "5", "4", and "6", respectively. The respective numbers (hereinafter referred to as "line numbers") attached to the lines form a basis for calculating a point acquirable by the player (as will be explained later in detail).

[0073] The gaming machine 1 provides 19 tile images 100 indicating arrangement tiles (i.e., 19 arrangement tiles are prepared), each comprising the vertical line 100a, right oblique line 100b, and left oblique line 100c with different line numbers attached thereto.

[0074] Next, at step 32, the CPU 32 determines whether the arrangement tile indicated by the tile image 100 displayed on the next tile display section 118 is the first tile or not. When the arrangement tile disposed at the next tile display section 118 is the first tile, the flow proceeds to step 34. When the tile is the second or later tile, the flow proceeds to step 33.

[0075] At step 33, the CPU 32 determines whether or not a predetermined time (5 seconds in this embodiment) has passed after moving the arrangement tile disposed at the next tile display section 118 in the previous session. When it is determined that the predetermined time has passed, the CPU 32 operates as the operation deactivating means and proceeds to step 41, which will be explained later, in order to annul the player's arrangement operation. When the player's arrangement operation is deactivated, an arrangement tile is automatically arranged at the game board 102. When it is determined to be within the predetermined time, on the other hand, the flow proceeds to step 34.

[0076] At step 34, the CPU 32 determines whether the arrangement tile indicated by the tile image 100 displayed on the next tile display section 118 is arranged at the game board 102 or not, i.e., whether the player has performed an arrangement operation or not. When

the arrangement tile is arranged at the game board 102 (the player has performed an arrangement operation) here, the flow proceeds to step 35; otherwise, the flow returns to step 31.

[0077] At the time of arrangement operation, the player performs the following operation. Here, the player touches the display position of the tile image 100 in the touch panel 56 with a contact body such as a finger, and moves it on the touch panel 56 to a desirable tile plate 102a, 102b, ... while keeping the contact body in contact therewith. This displays such an image as if the tile image displayed on the next tile image display section 118 moves onto its corresponding tile plate (tile plate 102b in Fig. 18B) in conformity to the player's arrangement operation as shown in Fig. 18A.

[0078] Subsequently, the CPU 32 adds 1 to the tile counter n (counter indicating the number of tiles arranged at the game board 102) at step 35, and proceeds to step 36, so as to determine whether the resulting tile counter n is at least 7 or not. When this condition is satisfied, the flow proceeds to step 37 subsequent thereto, where inputs of the give-up key 113 become active. Therefore, this condition is a condition (hereinafter referred to as "active condition") for making inputs of the give-up key 113 active. When this active condition is satisfied, the flow proceeds to step 37; otherwise, the flow returns to step 31, so as to cause the next tile display section 118 to display the tile image 100 indicating the next arrangement tile, and make the player perform the above-mentioned arrangement operation.

[0079] As the player repeatedly performs the arrangement operation in the manner mentioned above, the gaming proceeds stepwise, so as to display such an image as if the tile image 100 of the arrangement tile displayed on the next tile display section 118 sequentially moves to the tile plates 102a, 102b, ... within the game board 102 as shown in Fig. 19A, along which the tile counter n increases one by one.

[0080] When the active condition of step 34 is satisfied, on the other hand, the flow proceeds to step 37, where an effectuating process for making inputs of the give-up key 113 active is performed, so that the active give-up key 113 is displayed together with a message (e.g., GIVE-UP KEY OK!) indicating that inputs of the give-up key 113 are active, and the flow proceeds to step 38. Here, it is determined whether there is an input of the give-up key 113 or not. When the player touches the give-up key 113 by a contact body such as a finger, corresponding input information corresponding to the give-up key 113 is fed from the touch panel 56 to the CPU 32, whereby the CPU 32 determines whether or not there is an input from the give-up key 113 according to whether the corresponding input information is inputted or not. When there is an input from the give-up key 113, the flow proceeds to step 39; otherwise, the flow proceeds to step 40.

[0081] The flow proceeds to step 39 when the player operates the active give-up key 113, i.e., when the play-

er gives up further proceeding with game or abandons the proceeding with game after being fed up with game. Here, for minimal point warranty by which the player is provided with the minimal point, the gaming machine 1 automatically arranges the remaining tiles as follows so as to include contents of proceeding with game performed until the give-up key 113 was operated after starting the tile game. The automatic arrangement of remaining tiles displays such an image as if the tile images 100 of the arrangement tiles left without being arranged at the game board 102 (remaining arrangement tiles) are sequentially arranged into the game board 102. Here, the CPU 32 performs the automatic proceeding control displayed on the lower image display 5 without the operation by the player, and clearly shows the player an image after operating the give-up key 113 until the end.

[0082] Then, at step 40, it is determined whether the tile counter n is "19" or not (i.e., whether all the 19 arrangement tiles are disposed at the game board 102 or not). When the counter n is "19", the flow proceeds to step 41; otherwise, the flow returns to step 31, where the tile image 100 of the next arrangement tile is displayed on the next tile display section 118.

[0083] At step 41, the CPU 32 calculates a point according to the arrangement tiles arranged within the game board 102. At step 42 subsequent thereto, the point is displayed at corresponding positions on the upper image display 4 and lower image display 5, whereas payout is effected, whereby the tile arrangement operation is terminated. The point is calculated as follows.

[0084] The flow proceeding to step 41 encompasses a case where the player has arranged all of 19 arrangement tiles at the game board 102 by own operation, and the following case. Namely, it encompasses a case where, at a stage where the player has arranged some arrangement tiles (at least 7 tiles in this embodiment but may be at least 2 tiles) at the game board 102 by own operation, the proceeding with game is abandoned by an input from the give-up key 113, whereby the remaining tiles are automatically arranged. As mentioned above, the automatic arrangement of remaining tiles arranges all the 19 arrangement tiles at the game board 102. Therefore, both cases are the same in that all the 19 arrangement tiles are arranged, whereby an image of a state where the game board 102 is completely filled with 19 tile images 100 is displayed as shown in Fig. 19B.

[0085] Each tile image 100 comprises a vertical line 100a, a right oblique line 100b, and a left oblique line 100c which are provided with respective line numbers. When a plurality of tiles are arranged, the lines in the tiles may connect with each other vertically, horizontally, or obliquely. Therefore, the CPU 32 finds out thus connected lines, and sums up the respective line numbers attached onto the lines, thereby calculating a point. The resulting line becomes a complete line. The complete line number indicating the number of thus obtained com-

plete lines is displayed on the line display section 111.

[0086] Therefore, even when the player inputs the give-up key 113, if a complete line constituted by the arrangement tiles 100 arranged until then is obtained, the point will be calculated by incorporating this complete line. Hence, even if the player abandons the proceeding with game after operating the give-up key 113, gaming contents until then will be reflected in the point calculation, whereby the gaming contents with which the player has proceeded will not be wasted. After operating the give-up key 113, the flow may directly proceed from step 38 to step 41 without performing step 39.

[0087] When the player touches the help key 120 on the lower image display 5 during the proceeding with the foregoing bonus game, the gaming machine 1 in accordance with this embodiment can cause the upper image display 4 to display a gaming explanation image concerning gaming contents (image for explanations concerning gaming contents) in the bonus game such as how to arrange tiles, operating method, rules, and payout amount tables. When the player touches the help key 120 on the lower image display 5, the upper image display 4 switches from the image shown in Fig. 15 to the image shown in Fig. 16. The image on the upper image display 4 at this time is displayed under the control of the CPU 32 operating as the display control means. Fig. 16 is a view showing an example of the upper image display 4 when the gaming explanation image concerning gaming contents is displayed. In this drawing, the upper image display 4 displays modes of complete lines, their respective payout amounts 4d to 4i, etc.

[0088] Since the gaming explanation image concerning gaming contents is displayed on the upper image display 4 while the tile game image is displayed on the lower image display 5, the display of the gaming explanation image does not affect the proceeding with game. Therefore, once started, the bonus game proceeds without interruption even when the help key 120 is touched so as to display the gaming explanation image concerning gaming contents on the upper image display 4. If the help key 120 is disposed at a position distanced from the lower image display 5, it will be hard to operate the help key 120 so as to display the gaming explanation image concerning gaming contents onto the upper image display 4 when a time (time limit) during which the arrangement tiles can be moved is set as in this embodiment, even when an explanation concerning gaming contents is required to be displayed on the upper image display 4 at the time of moving the arrangement tile from the next tile display section 118.

[0089] However, since the tile game image includes the help key 120 as mentioned above, the help key 120 is displayed on the lower image display 5 in the gaming machine 1 in accordance with this embodiment. This makes it possible to operate the help key 120 easily while seeing the tile game image during playing the bonus game, for example, when moving the arrangement tile from the next tile display section 118.

[0090] In the gaming machine 1 in accordance with this embodiment, the gaming explanation image concerning gaming contents is displayed on the upper image display 4 different from the lower image display 5 displaying the tile game image. This does not deteriorate the visibility of the tile game image, whereby the display of the gaming explanation image concerning gaming contents does not obstruct the proceeding with the bonus game.

[0091] When the base game process is started at step 3 mentioned above, on the other hand, a slot game is played. Here, step 10 shown in Fig. 11 is initially performed, whereby a rotating process is executed. Namely, the CPU 32 instructs the motor driving circuit 52 to actuate the motors M1, M2, M3. Then, the reels 3L, 3C, 3R rotate. Subsequently, at step 11, the CPU performs a stop control process so as to respond to the result of determination at step 6. Namely, when a predetermined time has passed after starting actuating the reels 3L, 3C, 3R, the CPU 32 outputs an instruction to the motor driving circuit 52, so as to stop the reels 3L, 3C, 3R such that the symbols determined by step 6 appear at the pay line L1. In the stop control process, the CPU 32 outputs an instruction to the motor driving circuit 52, so as to stop the reels automatically. Since the gaming machine 1 includes three reels 3L, 3C, 3R, it performs three operations of determining stop positions of the reels (determining symbols to stop on the pay line). Namely, a stop position is determined for each reel.

[0092] This stop control process sequentially stops the reels 3L, 3C, 3L, as shown in Fig. 13 for example, such that the symbol of "7" appears in each of the symbol display windows 21L, 21C, 21R, whereby a symbol combination of "7-7-7" appears. Then, the flow proceeds to step 12, where a payout process is performed. Thereafter, the base game process ends. When the payout process is started, the CPU 32 instructs the hopper driving circuit 63 to pay out coins by a number corresponding to the number of payout (payout amount) determined by step 7, whereby the coins are paid out from the hopper 64. When it is determined from a signal from the payout completion signal circuit 65 that the coins are paid out, the CPU 32 terminates the payout process.

[0093] Though the present invention is specifically explained according to an embodiment in the foregoing, the present invention is not limited to the above-mentioned embodiment. For example, at step 33, the CPU 32 may determine whether or not a predetermined time has passed from when the tile image is displayed on the next tile display section 118.

[0094] The first game may also be any of games other than the reel game, e.g., card games such as poker and blackjack played by displaying card images, or a mahjong game.

[0095] The first game may be a tile game without playing the second game (such that only the tile game is played). The CPU 32 operates as the gaming proceeding control means in this case as well, and controls the

proceeding with game as shown in Fig. 22.

[0096] First, at step 50, a coin insertion or an operation of a BET switch is waited for. Upon the operation of the BET switch, the flow proceeds to step 20, and subsequent steps are processed up to step 23 as mentioned above.

[0097] Though the above-mentioned embodiment relates to the gaming machine 1 including the mechanical reels 3L, 3C, 3R by way of example, the present invention is also applicable to pachislo machines including mechanical reels 3L, 3C, 3R as a matter of course.

[0098] The gaming machine in accordance with the present invention does not always need gaming with mechanical reels, whereby the present invention is also applicable to gaming machines (not depicted) including the upper image display 4 and lower image display 5 without the mechanical reels 3L, 3C, 3R. For example, the present invention is applicable to gaming machines displaying an image different from reel images as a gaming image on the upper image display 4 or lower image display 5 (e.g., card gaming machines which can play games such as poker and blackjack by displaying card images or mahjong gaming machines which can play mahjong games). These gaming machines may play stepwise game as in the gaming machine 1 in the base game instead of the bonus game.

[0099] Though three reels are arranged in a horizontal row in the gaming machine 1, the number of reels is not restricted to 3. The number of reels may be 5 or 9, for example.

[0100] The present invention is also applicable to gaming machines mounted with display devices capable of displaying images (e.g., display devices using organic EL) other than the liquid crystal display devices 41, 140.

[0101] The present invention can provide a gaming machine which can easily carry out an operation for acquiring explanations concerning gaming contents while proceeding with game.

[0102] It is apparent that various embodiments and modifications of the present invention can be embodied, based on the above description. Accordingly, it is possible to carry out the present invention in the other modes than the above-mentioned best mode, within the following scope of claims and the scope of equivalents.

Claims

1. A gaming machine comprising first display means and second display means for displaying an image; display control means for controlling the display of the first and second display means; shift determining means for determining whether a shift condition for shifting a game mode from a base game to a bonus game is satisfied or not; and shifting means for shifting the game from the base game to the bonus game according to a result of determination by

the shift determining means;

the gaming machine further comprising touch input means, disposed in front of the first display means, for inputting input information corresponding to a touch position of a finger;

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wherein, after the shifting means shifts the game to the bonus game, the display control means causes the first display means to display a gaming image including a help operation key image for displaying a gaming explanation image concerning a gaming content in the bonus game, and causes the second display means to display the gaming explanation image when the input information corresponding to the help operation key image is fed from the touch input means.

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2. A gaming machine according to claim 1, wherein the display control means displays as the gaming image an image including a gaming operation image for performing a gaming operation in the special game mode.
3. A gaming machine according to claim 1 or 2, further comprising operation deactivating means by which, in first and second game operations sequentially performed by a player with the gaming operation image, the second game operation is deactivated after a predetermined period from the first game operation.

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Fig.1

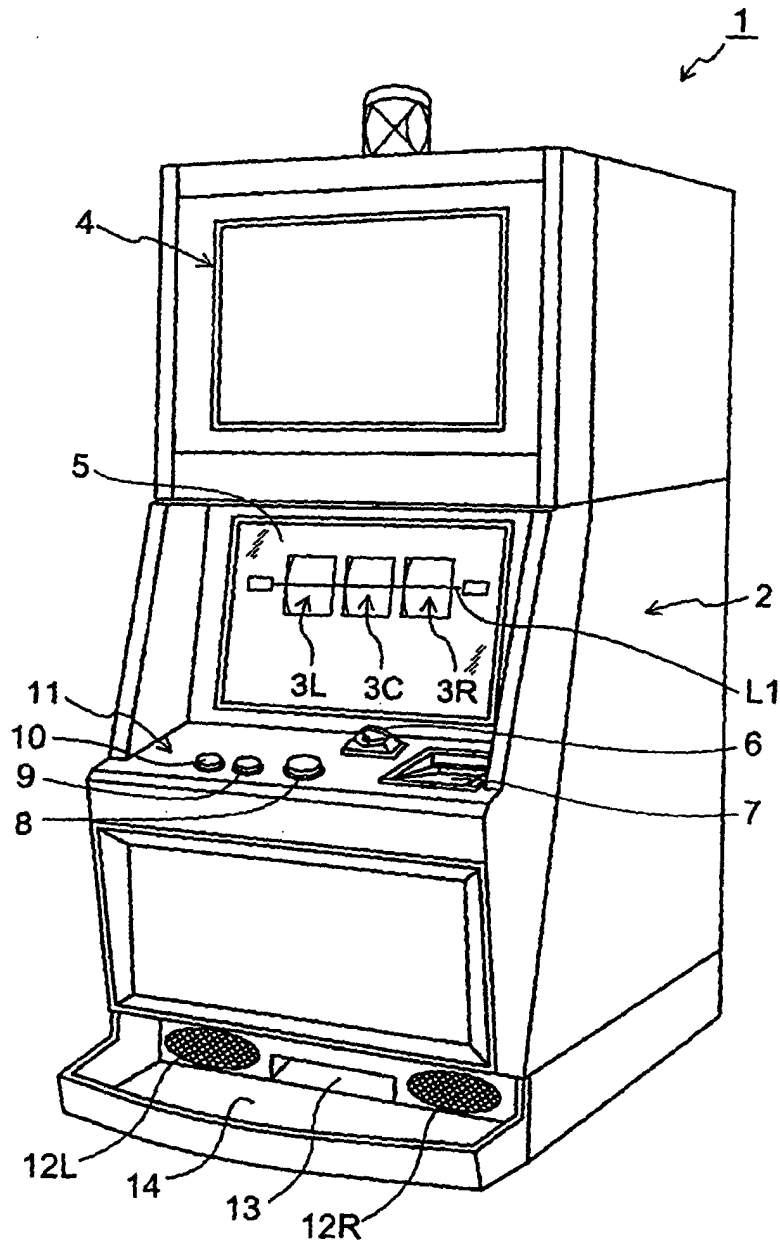


Fig.2

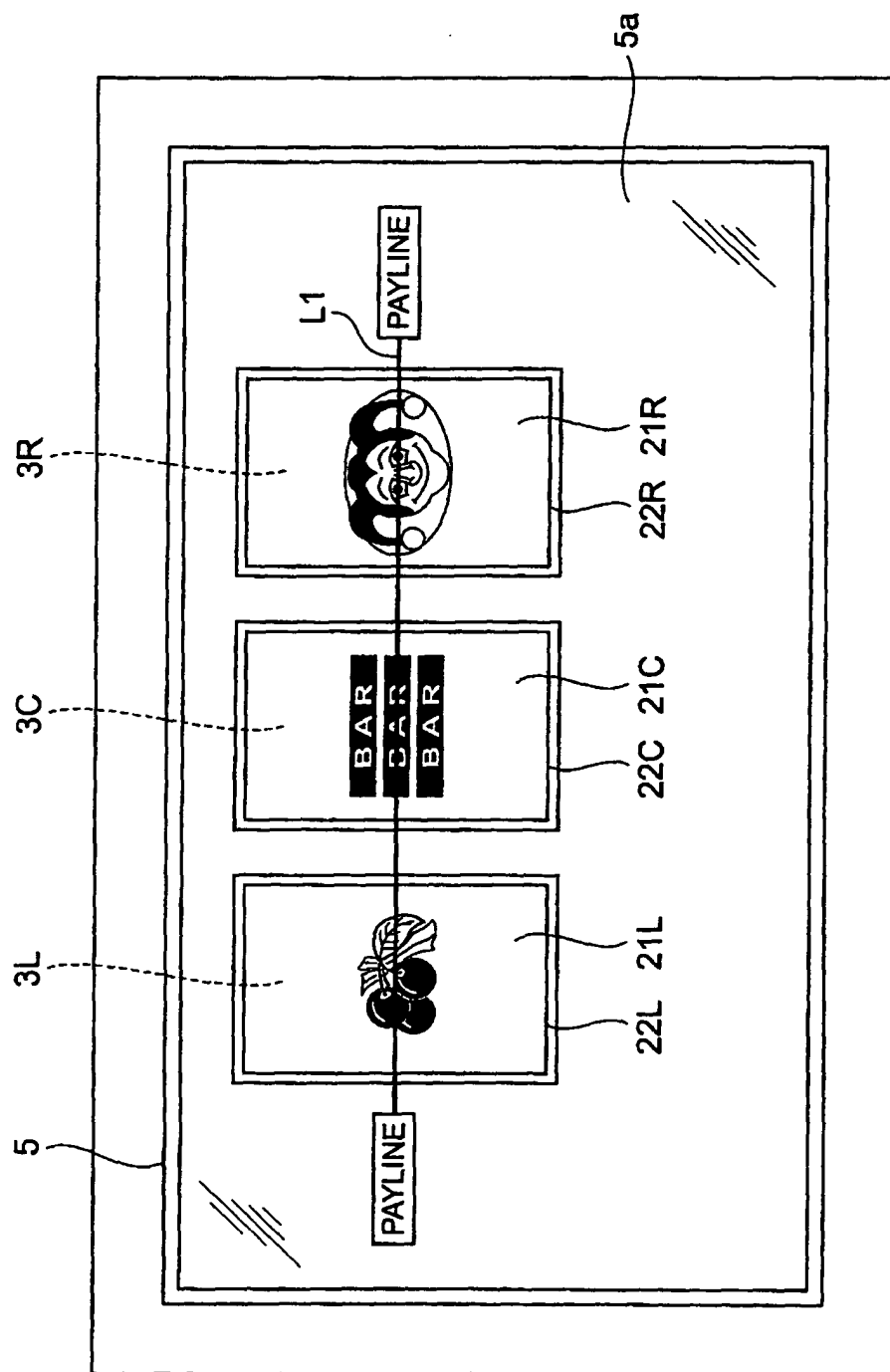


Fig.3

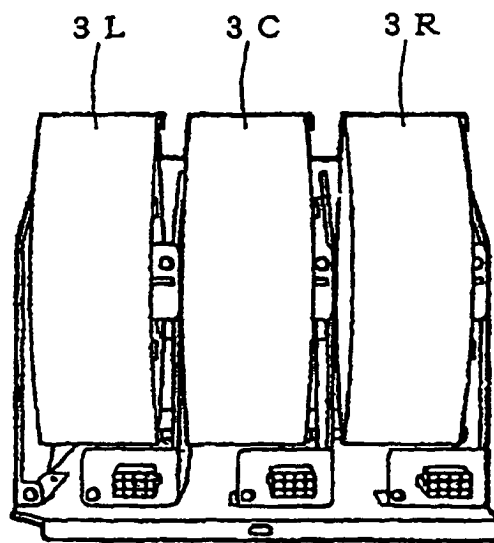


Fig.4

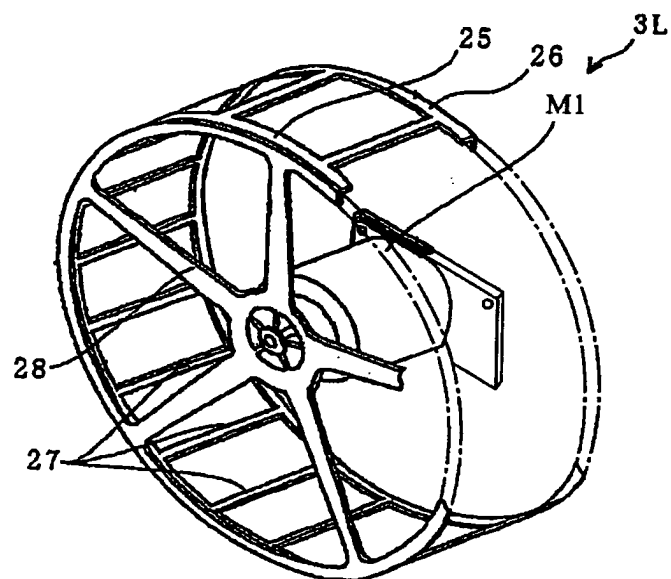


Fig.5

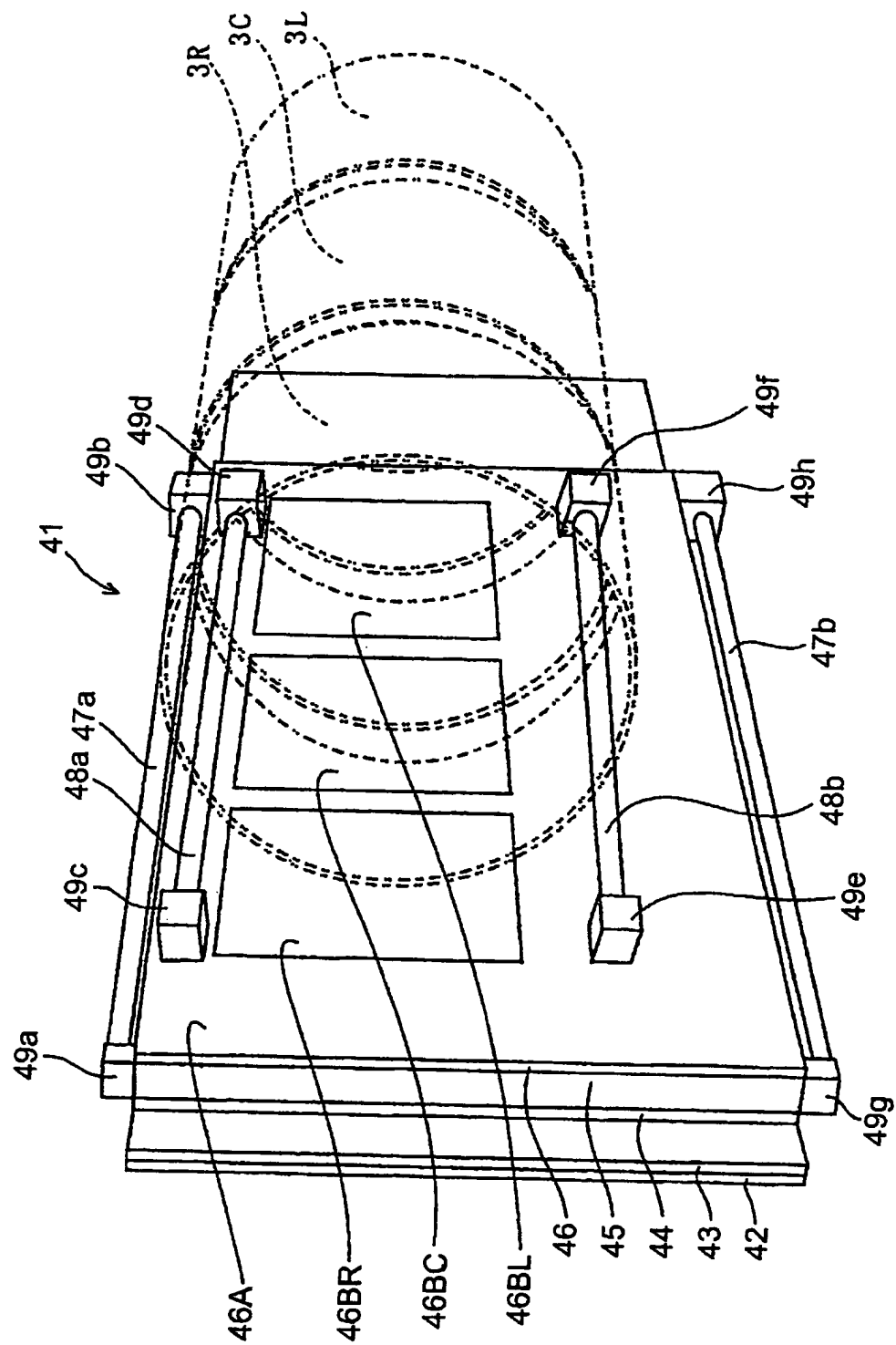


Fig.6

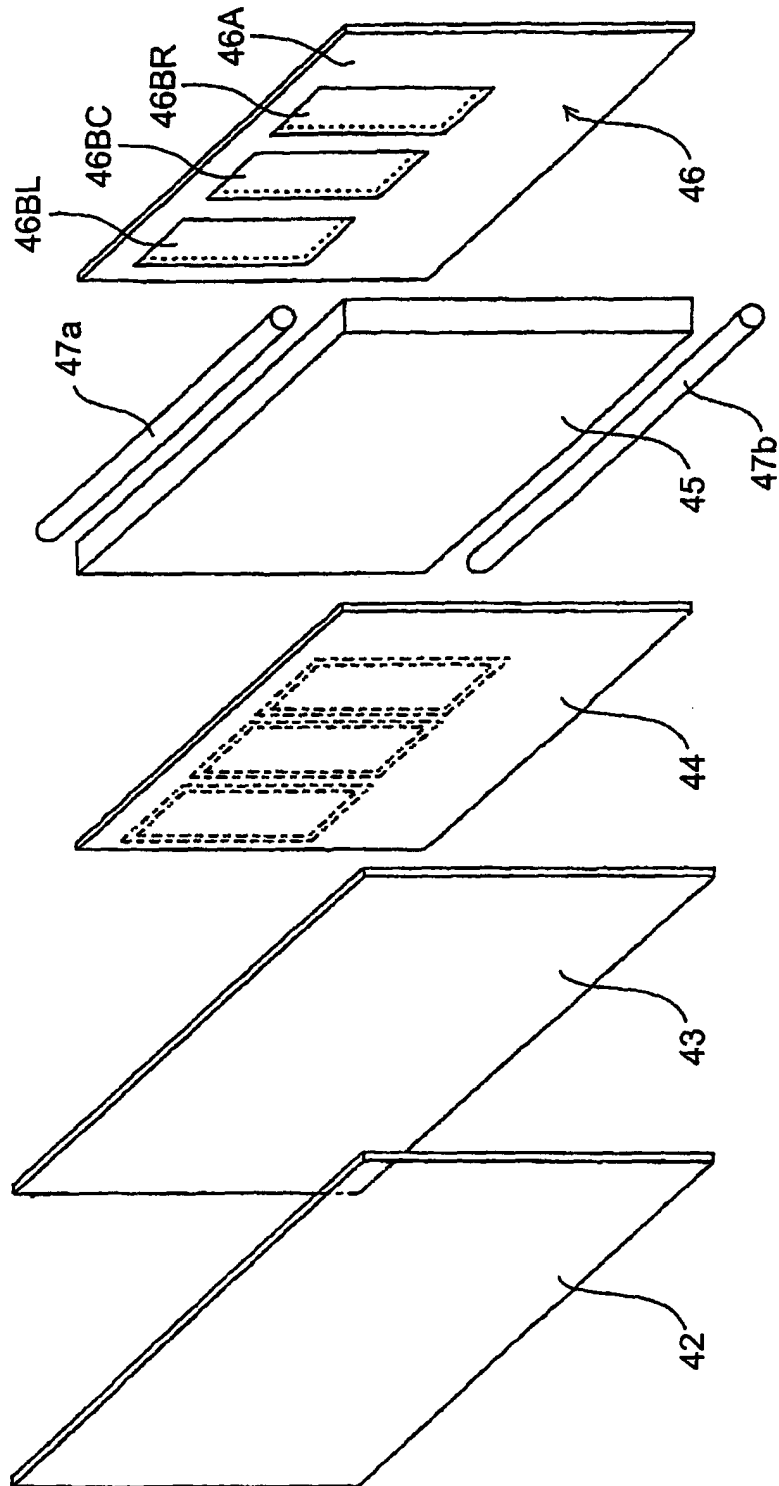


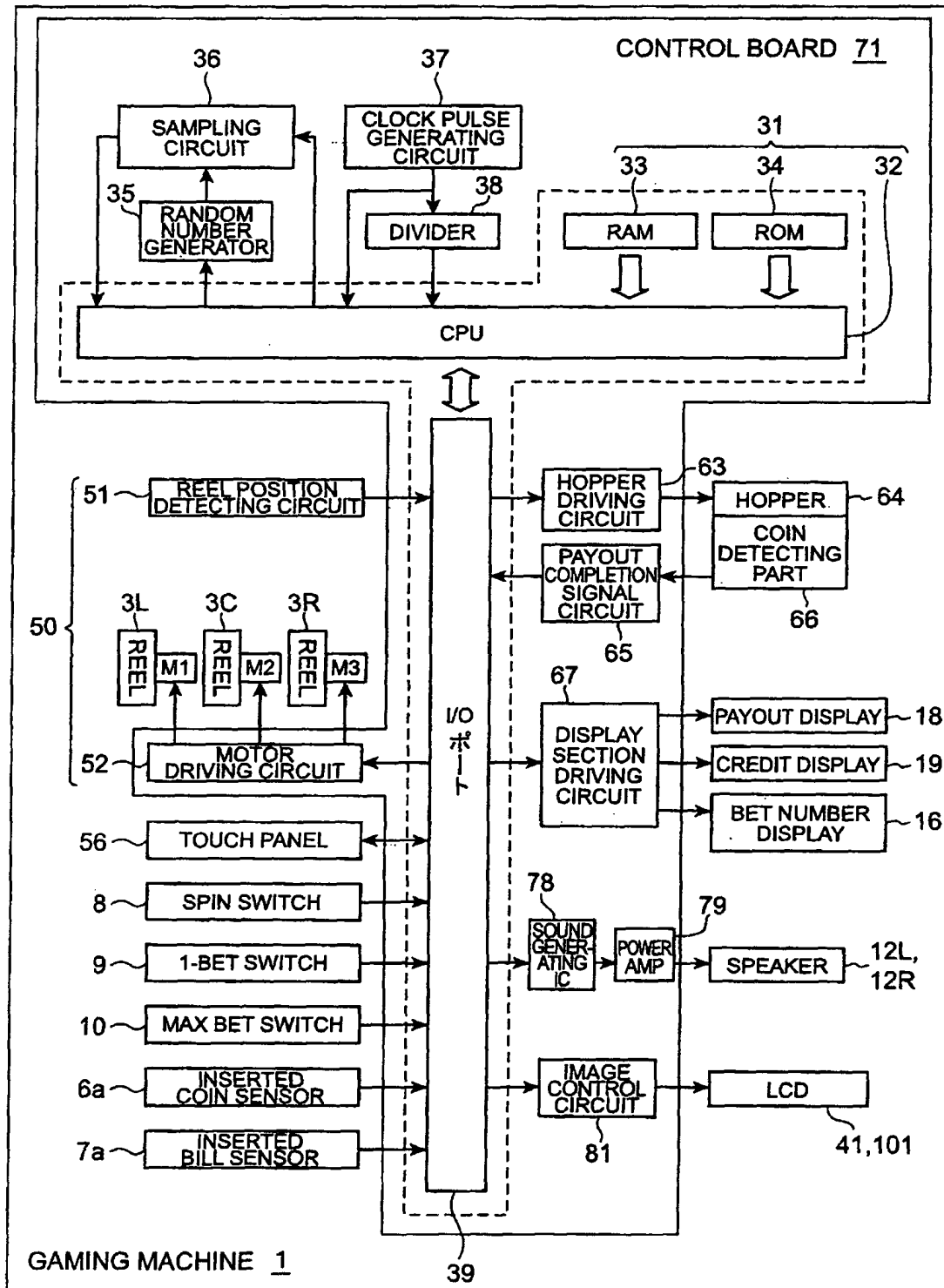
Fig.7

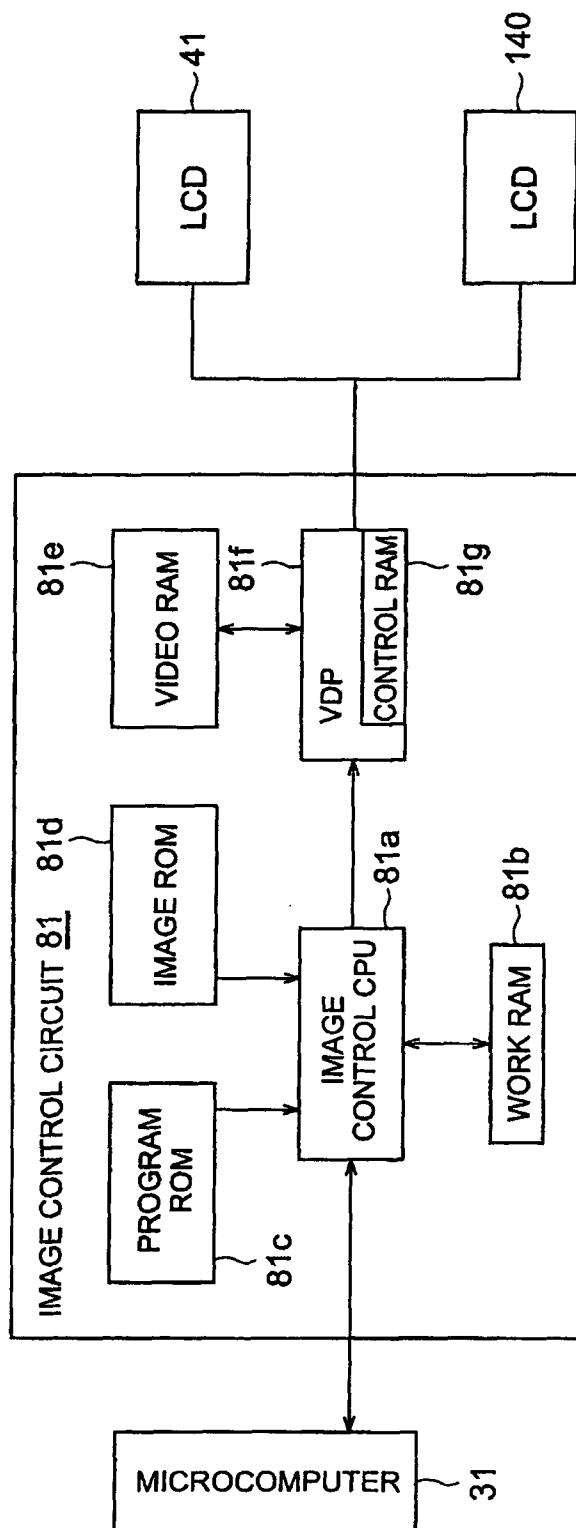
Fig.8

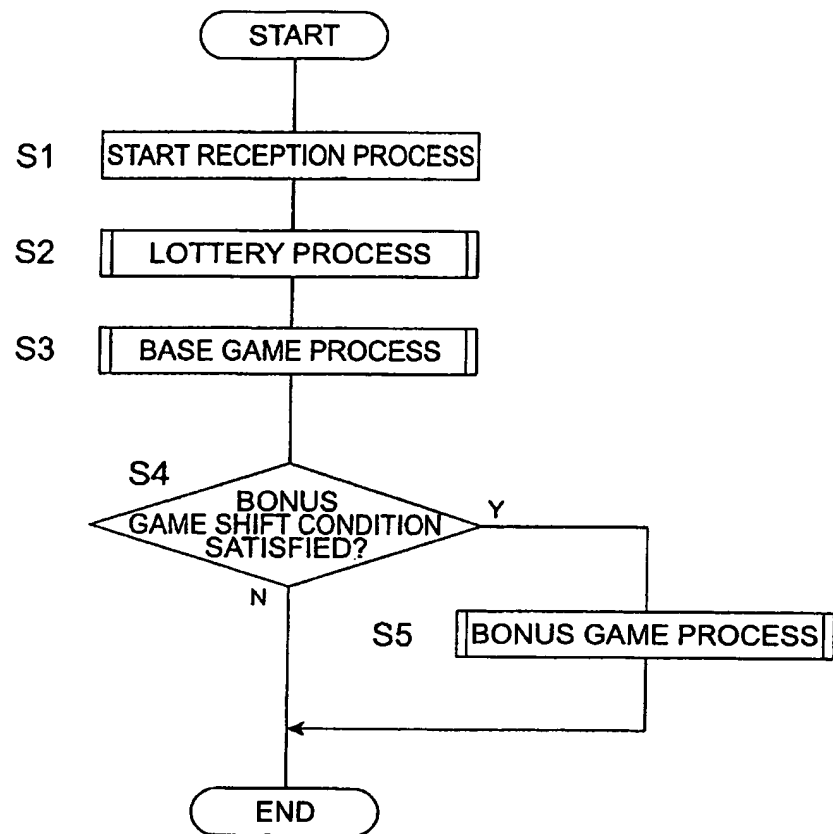
Fig.9

Fig.10

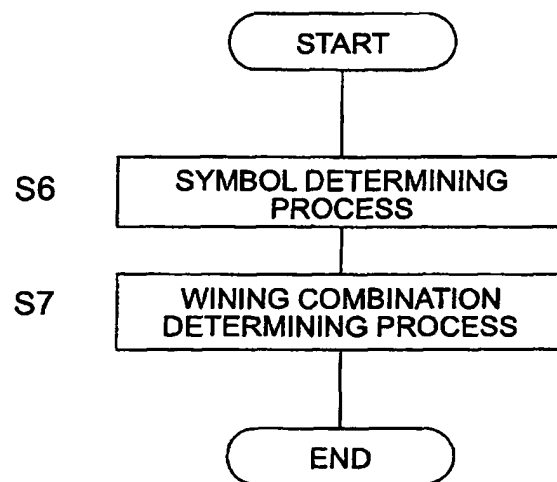


Fig.11

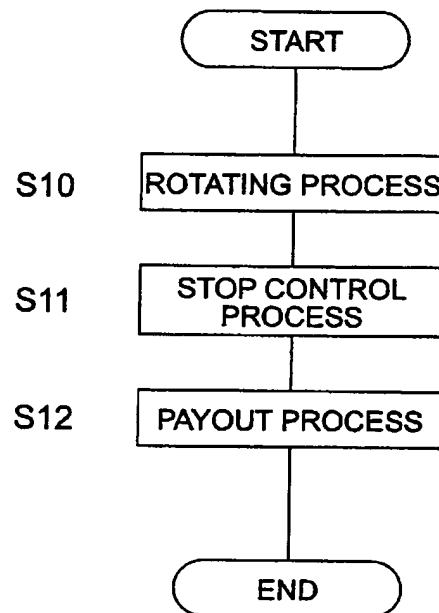


Fig.12

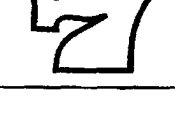
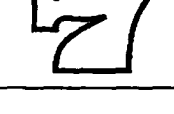
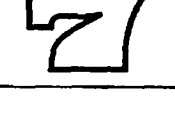
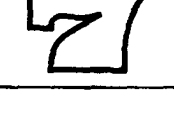
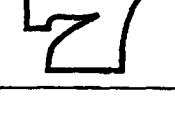
90a		90b			90
CODE NO.		R1	R2	R3	
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C2	1				b
C3	2				
C4	3				
	4				c
	5				
	6				
	7				
	8				
	9				
	10				

Fig.13

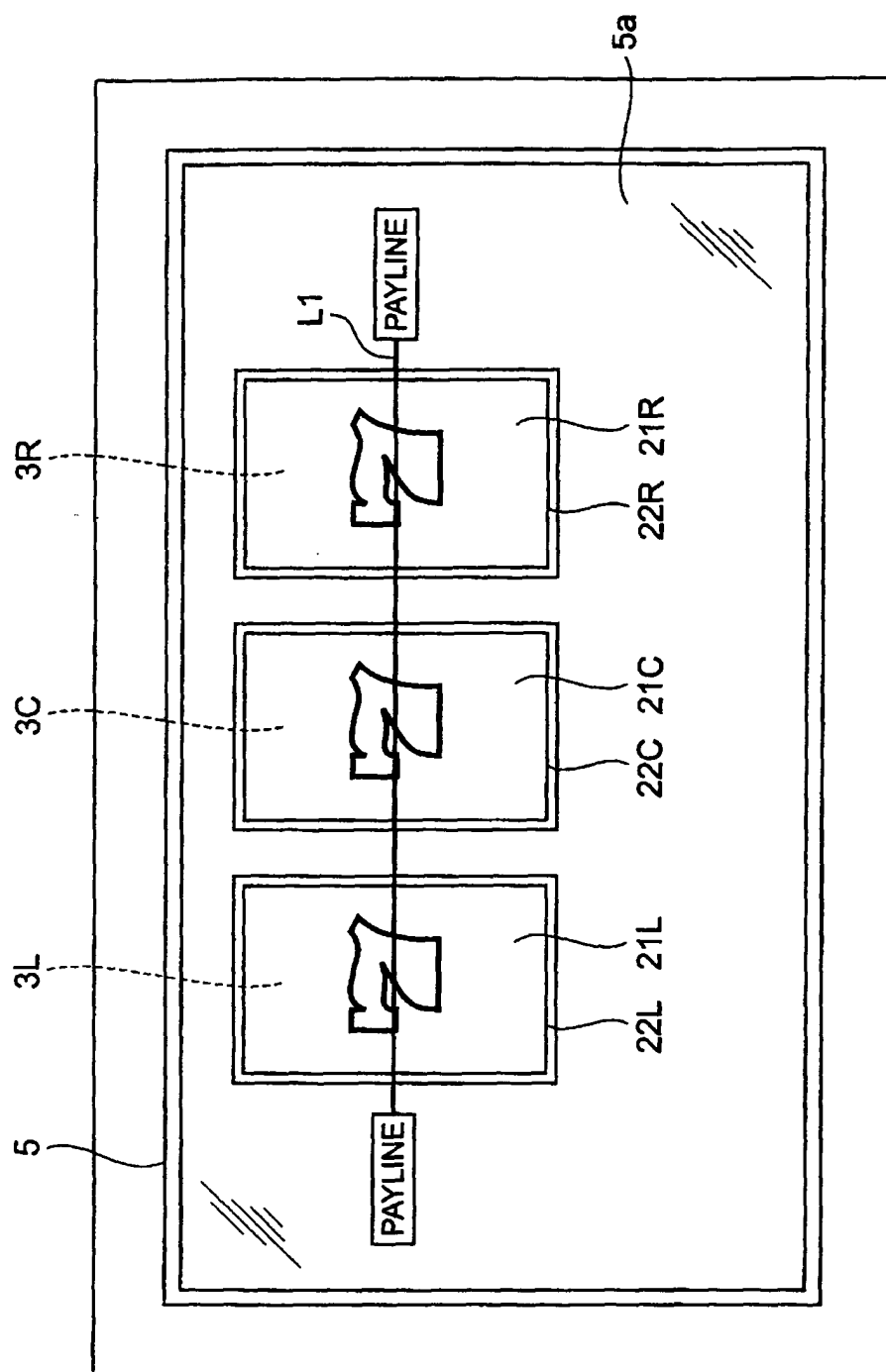


Fig.14

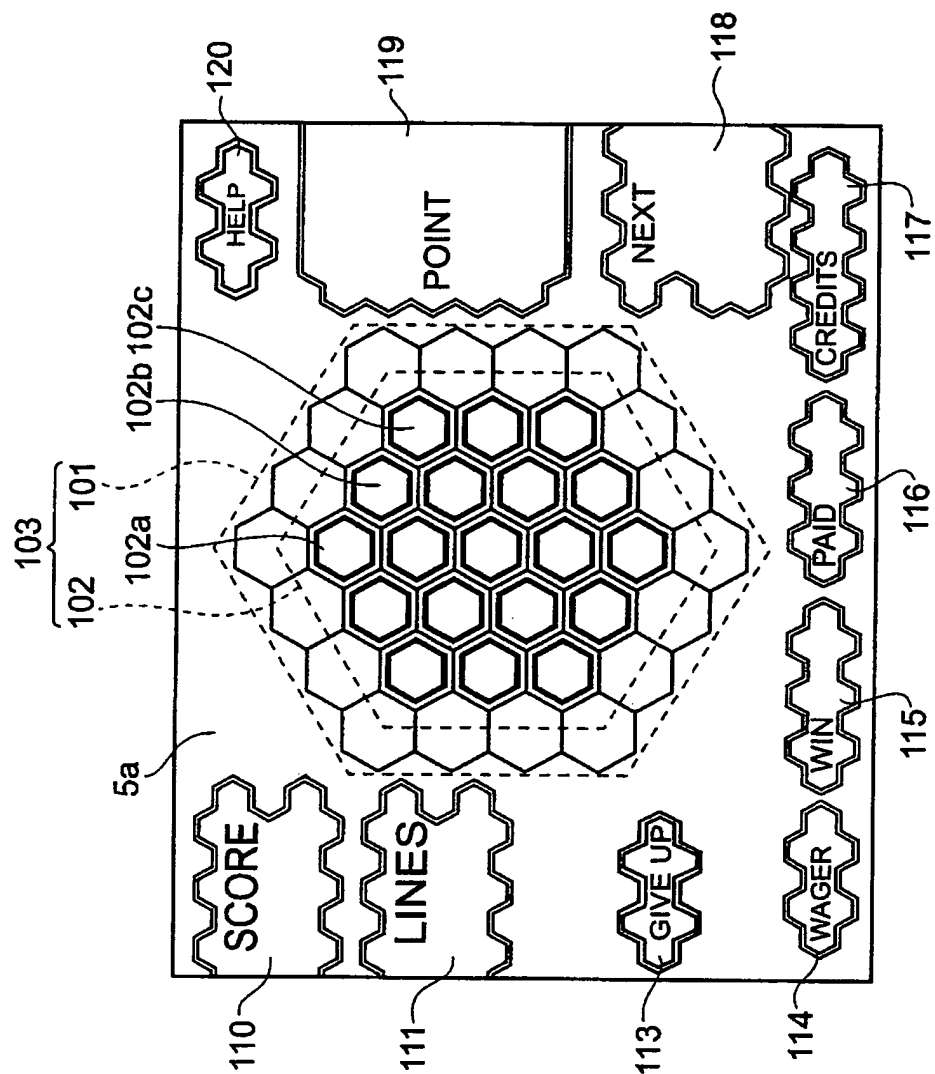


Fig.15

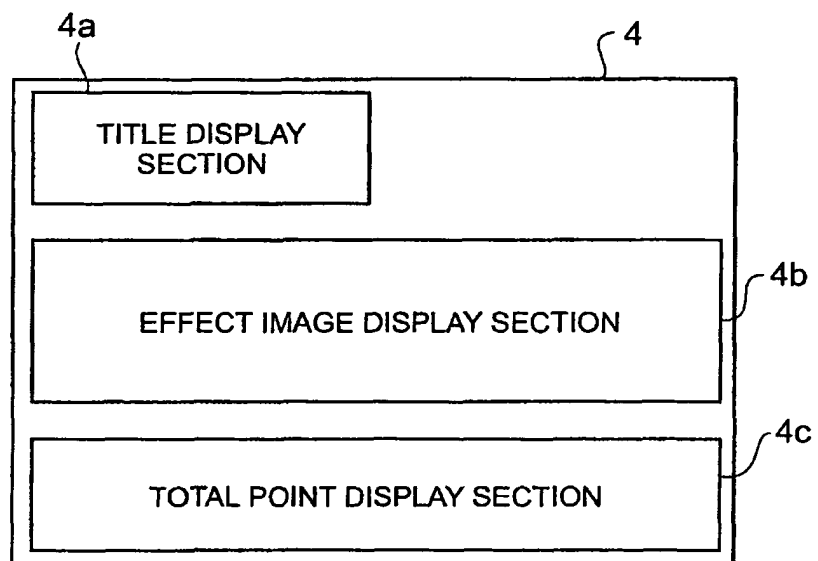


Fig.16

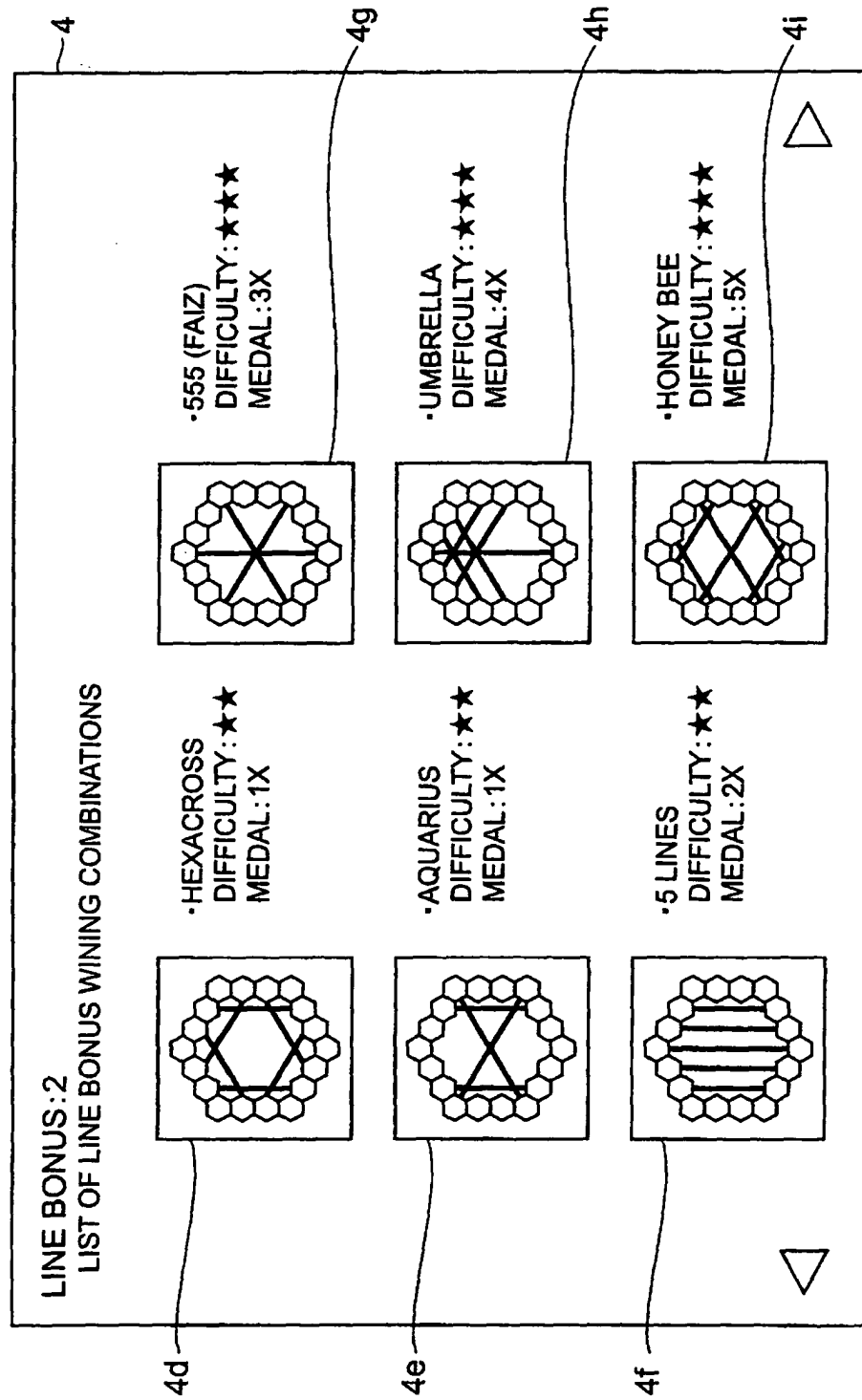


Fig.17

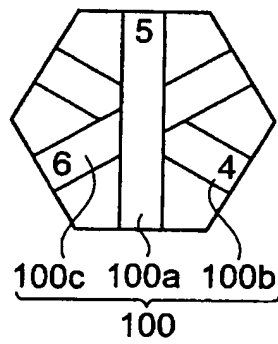


Fig.18A

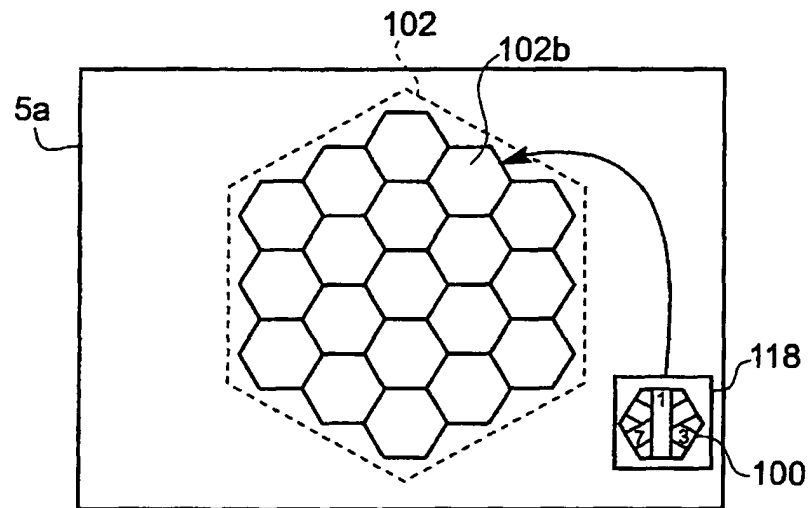


Fig.18B

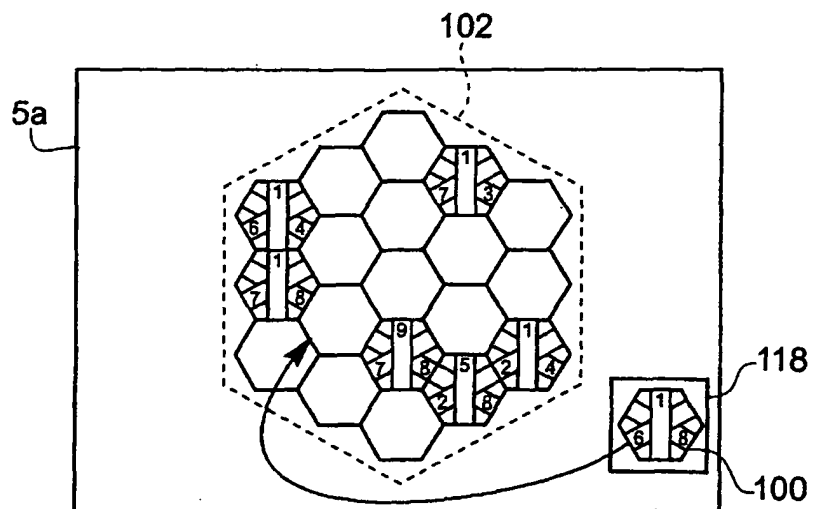


Fig.19A

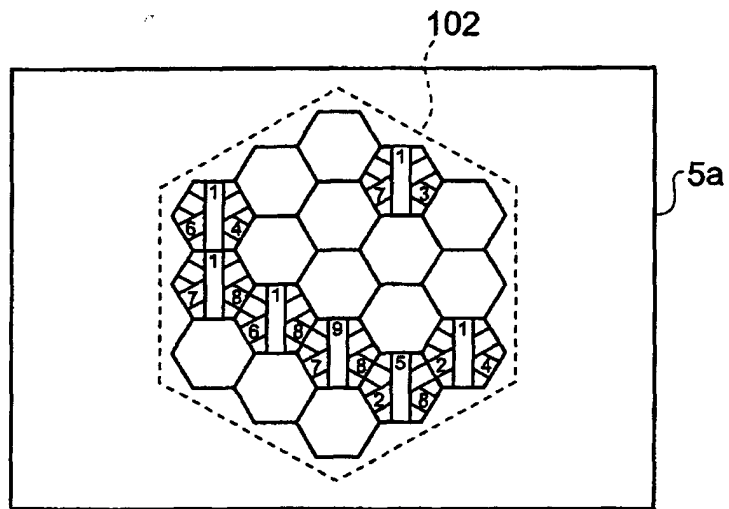


Fig.19B

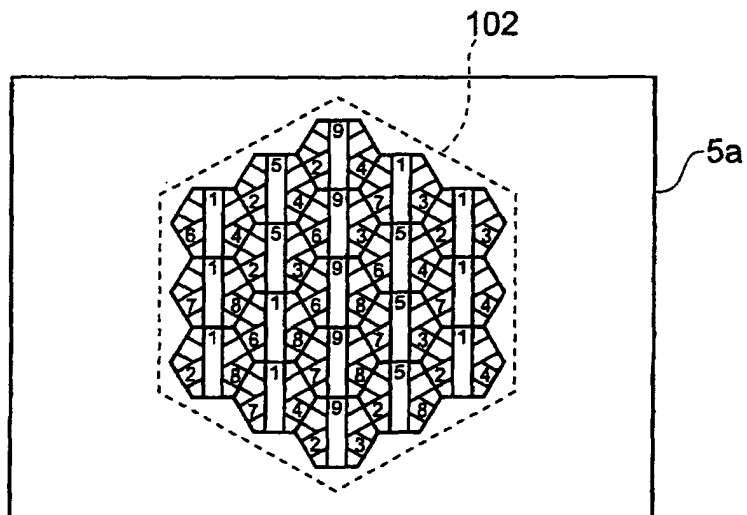


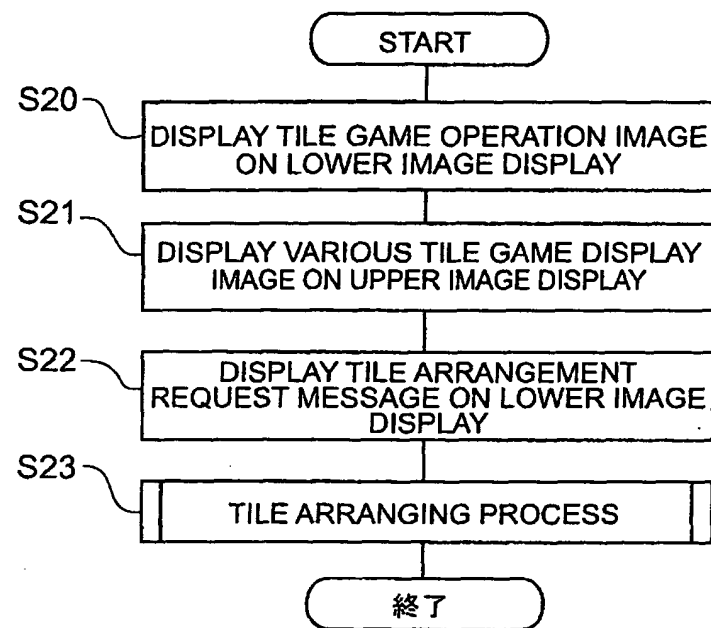
Fig.20

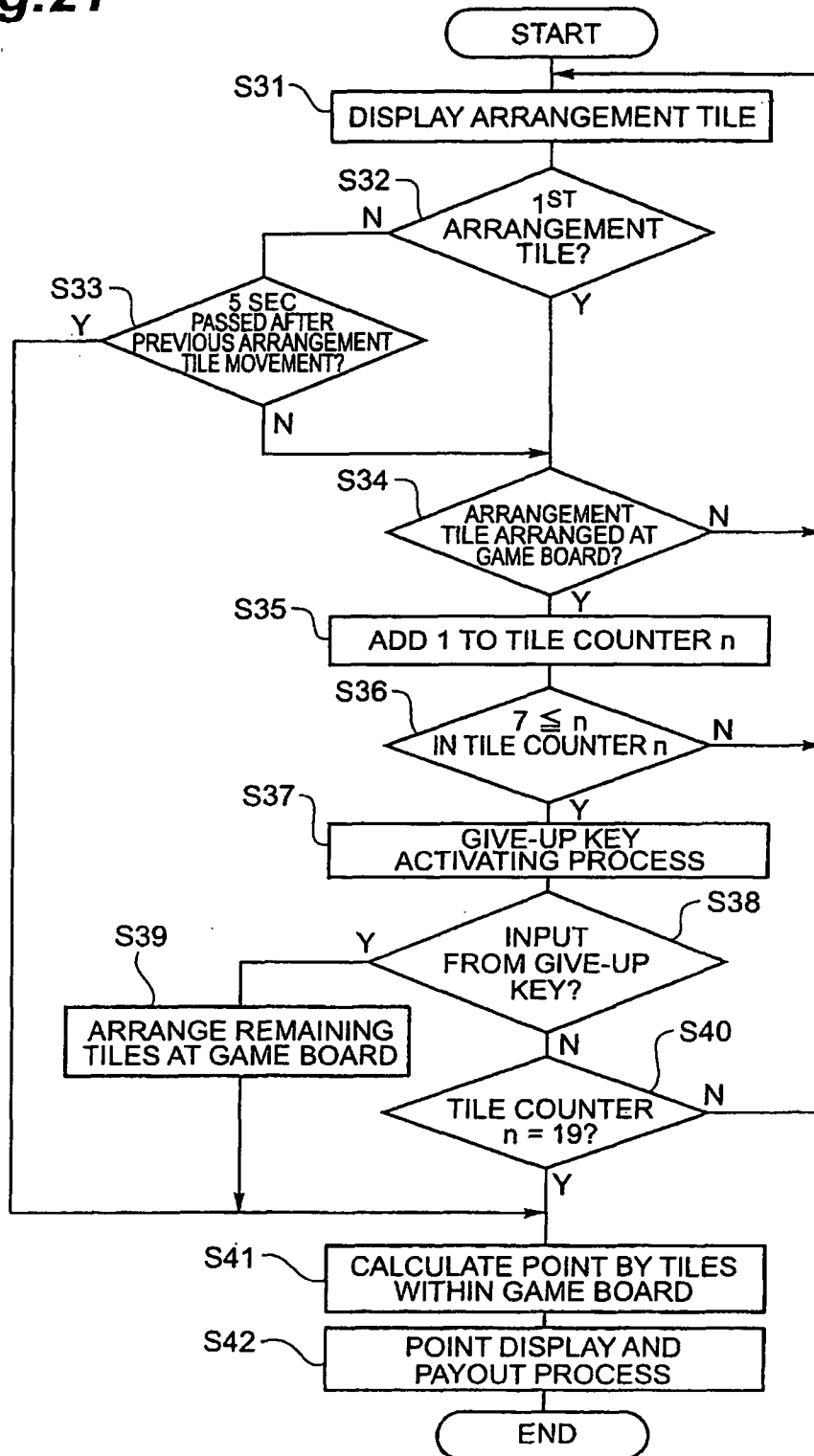
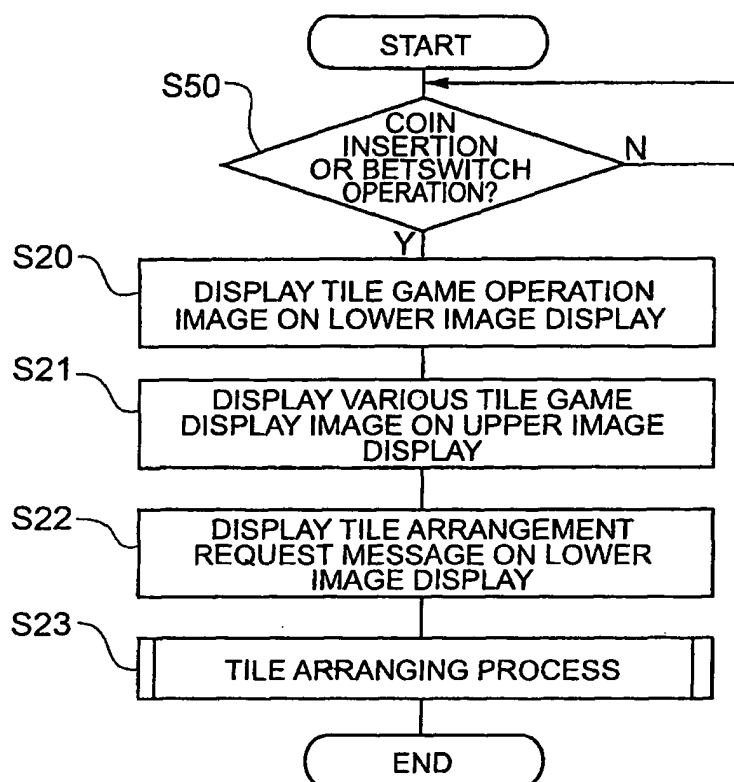
Fig.21

Fig.22



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 4154

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2003/157978 A1 (ENGLMAN ALLON G) 21 August 2003 (2003-08-21) * page 2, paragraph 24 - paragraph 25 * * page 3, paragraph 34 * * figure 3 *	1-3	G07F17/32
X	US 2003/087690 A1 (LOOSE TIMOTHY C ET AL) 8 May 2003 (2003-05-08) * page 1, paragraph 12 - paragraph 13 * * page 2, paragraph 21 * * figure 3 *	1-3	
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