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Game machine informing prize mode information based on stopping all rotating reels

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ABSTRACT OF THE DISCLOSURE

Although in a conventional game machine, a result of inner lottery causing a big hit prize is informed simply by lighting on lamps with no interest of game, according to the present invention, when a special game prize hit flag is erected, a processing of controlling to wink reel lamps is carried out in stopping all the reels 3 through 5 and back lamps 57a, 57b and 57c of the respective reels 3 through 5 are winked by a predetermined display mode, for example, when "BB" hit flag is erected, the back lamps 57a, 57b and 57c at an upper column, a middle column and a lower column of the second reel 4 are successively lighted on as shown in Fig. 11A, Fig. 11B and Fig. 11C, thereafter, the respective back lamps 57c, 57b and 57a at the lower column, the middle column and the upper column of the first reel 3 and the third reel 5 are lighted on as shown in Fig. 11D, Fig. 11E and Fig. 11F and the player can be informed of the fact that a special game is caused by looking at the display mode.

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COMPLETE SPECIFICATION

STANDARD PATENT

Applicant(s):

ARUZE CORPORATION

Invention Title:

GAME MACHINE INFORMING PRIZE MODE INFORMATION BASED ON STOPPING ALL ROTATING REELS

The following statement is a full description of this invention, including the best method of performing it known to me/us:

TITLE OF THE INVENTION

GAME MACHINE INFORMING PRIZE MODE INFORMATION BASED ON STOPPING ALL ROTATING REELS

This patent application claims priority based on the Japanese patent application, H09-352172 filed on December 5, 1997 the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates to a game machine in which prize mode is determined by random number lottery and a special game prize mode is produced.

2. Description of the Related Art:

Conventionally, there has been, for example, a slot machine as a game machine of this kind. In a general slot machine, three reels are parallelly installed in three columns on the rear side of a front panel. Various patterns are illustrated on outer peripheries of the respective reels and the patterns are illuminated from the rear side by built-in light sources (back lights) installed at the respective reels and observed via respective windows formed at the front panel. Five prize lines are described at the windows and the slot machine is played by to which prize line a predetermined combination of patterns is set.

A game is started by inserting a coin into a slot by a player and when a start lever is operated by the player, the respective reels start to rotate simultaneously. When the respective reels reach a constant speed, operation of respective stop buttons installed in correspondence with the respective reels becomes effective. The player operates the respective stop buttons while observing moving patterns, stops rotation of the respective reels and tries to stop and display predetermined patterns on any of the prize line. The respective reels stop rotating in accordance with operational timings of stop buttons. When a predetermined combination of patterns is displayed on any of the prize lines in stopping the reels, a prize in accordance with the combination of patterns is awarded.

There are a big hit prize, a medium hit prize, a small hit prize and so on in the prize modes. The big hit prize and the medium hit prize constitute special game prize modes which are caused when a predetermined number of patterns "7" or special character patterns are set on the prize line. In the case of the big hit prize, a special game referred to as big bonus game (BB game) can be carried out and in the case of the medium hit prize, a special game referred to as regular bonus game (RB game) can be carried out by which a large number of coins can be acquired. Further, the small hit prize is caused when three of patterns such as "cherry" or "bell" are set on the prize line and in the case of the small hit, several coins can be

acquired.

Such a prize mode is determined by random number lottery which is executed immediately after operating the start lever and has been already determined before the player operates to stop the respective reels. The random number lottery is executed by prize mode determining means constituted at inside of the game machine. When the big hit prize is determined by the random number lottery, a lamp installed at a front panel of the machine is lighted on and the player is informed of the fact that the big hit prize has been caused by inner lottery of the machine. Thereafter, when rotation of the respective reels are controlled to stop in response to operation of the stop buttons by the player and a prize combination of patterns which has been determined by the random number lottery is stopped and displayed on the prize line, the prize can be experienced actually.

However, according to the above-described conventional game machine, an occurrence frequency of the big hit per se is small from the start, occurrence of the big hit prize is informed simply by lighting on the lamp and therefore, no interest of game is produced.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, there is provided a game machine comprising prize

mode determining means for determining a prize mode of game by random number lottery, a plurality of rotating reels outer peripheries of which are illustrated with various patterns for stopping and displaying a combination of the patterns in accordance with the prize mode determined by the prize mode determining means, and a plurality of light sources installed to the respective rotating reels for illuminating the patterns stopped and displayed by the respective rotating reels from a rear side, further comprising informing means for informing a player that the prize mode of a special game is determined by the prize mode determining means by light-on control of the respective light sources in a predetermined display mode under a condition of stopping all of the respective rotating reels.

Preferably, the respective light sources installed on the rear sides of the rotating reels are light-on controlled in a predetermined display mode by the informing means and the special game prize is informed to the player.

Therefore, the special game prize is informed with ornamental performance higher than that in the conventional case. Further, the light-on control is carried out in a wide area using all of reel windows in front of the player and therefore, the special game prize is caught by visual sense of a player with strong impact and the player can further strongly taste actual feeling of pleasure of the special game prize.

Also, the player expects at each game that the light-on control which is visually pleasant emerges after stopping all of the rotating reels. As a result, the tastefulness of game is enhanced.

Further, according to another aspect of the present invention, the informing means informs the player at a predetermined probability that the prize mode of the special game is determined by the prize mode determining means. Further, according to another aspect of the present invention, the informing means informs the special game prize to the player at a predetermined probability also when a prize mode other than the special game mode is determined by the prize mode determining means.

The special game prize may be informed to the player or may not be informed thereto. Further, even when a prize mode other than the special game prize is determined by the prize mode determining means, the special game prize is informed at a predetermined probability. Therefore, information of the special game prize is expected by the player. That is, by constructing a constitution in which the special game prize is informed at a predetermined probability, when the special game prize is informed, the pleasure is enhanced and the tastefulness of the game is further promoted.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view showing an outlook of a slot machine according to a first embodiment of the present invention;

Fig. 2 is a perspective view showing a rotating reel unit of the slot machine shown in Fig. 1;

Figs. 3A and 3B are perspective views showing a structure of rotating reels constituting the rotating reel unit illustrated in Fig. 2;

Figs. 4A, 4B and 4C are views showing a state in which prize lines described on display windows of the slot machine illustrated in Fig. 1 are successively made effective;

Fig. 5 is a block diagram showing a principal control circuit constitution of the slot machine illustrated in Fig. 1;

Fig. 6 is a diagram showing a prize probability table used in game processing of the slot machine according to the embodiment;

Fig. 7 is a diagram showing a symbol table used in the game processing of the slot machine according to the embodiment;

Fig. 8 is a first flowchart showing the game processing of the slot machine according to the embodiment;

Fig. 9 is a second flowchart showing the game processing of the slot machine according to the embodiment;

Figs. 10A through 10K are timing charts indicating timings of respective portions of circuit in the game processing of the

slot machine according to the embodiment;

Figs. 11A through 11F are views showing a display mode of reel back lamps which are light-on controlled by informing means when a prediction of a "BB" flag is informed in the game processing of the slot machine according to the embodiment;

Figs. 12A through 12E are views showing a display mode of reel back lamps which are light-on controlled by informing means when a prediction of an "RB" flag is informed in the game processing of the slot machine according to the embodiment;

Figs. 13A through 13E are views showing other example of the display mode informing the prediction of the "BB" flag illustrated in Figs. 11A through 11F;

Figs. 14A through 14E are views showing a former half of other example of the display mode of informing the prediction of the "RB" flag illustrated in Figs. 12A through 12E;

Figs. 15F through 15I are views showing a latter half of the other example of the display mode of informing the prediction of the "RB" flag illustrated in Figs. 12A through 12E;

Fig. 16 is a diagram showing a prize mode informing selection lottery table used in game processing of a slot machine according to a second embodiment; and

Fig. 17 is a flowchart showing the game processing of the slot machine according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Next, an explanation will be given of a first embodiment in which a game machine according to the present invention is applied to a slot machine.

Fig. 1 is a front view of a slot machine 1 according to the embodiment.

Three reels 3, 4 and 5 constituting a variable display device are rotatably installed on the rear side of a front panel 2 of a slot machine 1. Outer peripheral faces of the respective reels 3, 4 and 5 are illustrated with columns of symbols each comprising a plurality of kinds of patterns (hereinafter, referred to as symbols). Three of the symbols are observed via each of display windows 6, 7 and 8 at a front face of the slot machine 1. Further, a slot 9 into which a player inserts coins is installed on the lower right side of the display windows 6, 7 and 8.

The respective reels 3 through 5 constitute a rotating reel unit shown in Fig. 2 and are attached to a frame 51 via brackets 52. The respective reels 3 through 5 are constituted by pasting reel bands 54 on outer peripheries of reel drums 53. The above-described symbol columns are illustrated on outer peripheral faces of the reel bands 54. Further, the respective brackets 52 are installed with stepping motors 55 and the respective reels 3 through 5 are rotated by being driven by the motors 55.

Fig. 3A shows the structure of each of the reels 3 through 5. Further, portions in Fig. 3A the same as those in Fig. 2 are attached with the same notations and an explanation thereof will be omitted. A lamp case 56 is installed at inside of the reel drum 53 on the rear side of the reel band 54 and back lamps 57a, 57b and 57c are respectively installed in three respective chambers of the lamp case 56. As shown in Fig. 3B, the back lamps 57a, 57b and 57c are mounted on a board 58 and the board 58 is attached to the rear side of the lamp case 56. Further, a photosensor 59 is attached to the bracket 52. The photosensor 59 detects a shield plate 60 installed to the reel lamp 53 passing through the photosensor 59 in accordance with rotation of the reel drum 53.

The respective back lamps 57a, 57b and 57c are light-on controlled individually by a lamp drive circuit 48, mentioned later. By lighting on the respective back lamps 57a, 57b and 57c, three of the symbols disposed in front of the respective back lamps 57a, 57b and 57c are individually lighted on from the rear sides in the symbols illustrated on the reel bands 54 and the three symbols are projected on each of the display windows 6 through 8.

Further, the display windows 6 through 8 shown in Fig. 1 are inscribed with prize lines of horizontal three lines (a central line L1, a top line L2A and a bottom line L2B) and diagonal two lines (a negative slope line L3A, a positive slope

line L3B). Before starting the game, when a player inserts one sheet of coin to the coin slot 9, only the central prize line L1 inscribed above the reels 3 through 5 is made effective as shown in Fig. 4A. Further, when two sheets of coins are inserted into the slot 9, the top and bottom prize lines L2A and L2B are made effective in addition to the central line and the three horizontal prize lines L1, L2A and L2B are made effective as shown in Fig. 4B. Further, when three sheets of coins are inserted into the slot 9, all of the prize lines L1, L2A, L2B, L3A and L3B are made effective as shown in Fig. 4C.

Further, circle marks in Figs. 4A, 4B and 4C represent symbols illustrated on the respective reels 3 through 5. The effectiveness of the prize lines are displayed to a player by lighting on effective line display lamps 23 arranged at end portions of the respective prize lines (refer to Fig. 1).

Further, a 1BET switch 10, a 2BET switch 11 and a maxBET switch 12 are installed on the lower left side of the display windows 6 through 8. When coins are deposited to display at a credit number display portion 13, instead of inserting coins into the coin slot 9, one sheet, two sheets and three sheets of coins are betted in one game by respective button depressing operation of the 1BET switch 10, the 2BET switch 11 and the maxBET switch 12. The credit number display portion 13 is constituted by 7-segment LEDs (Light Emitting Diode) having a number in accordance with a number of digits of displayed

numerical values and displays a number of coins deposited currently.

A credit/payment changeover switch (C/P switch) 14 and a start lever 15 are installed on the lower side of the BET switches 10 through 12 and stop buttons 16, 17 and 18 are installed at a central portion of the machine on the right side of the start lever 15. By button depressing operation of the C/P switch 14, credit/payment of coins can be switched.

By operating the start lever 15, rotation of the reels 3, 4 and 5 is simultaneously started. The stop buttons 16, 17 and 18 are arranged in correspondence with the respective reels 3, 4 and 5. When the rotational speed of the respective reels 3 through 5 reaches a constant speed, operation of the respective stop buttons 16 through 18 is made effective and rotation of the respective reels 3 through 5 is stopped in accordance with button depressing operation of the player.

Further, sound emitting holes 19 and a coin tray 20 are installed at the lower portion of the front face of the slot machine 1. The sound emitting holes 19 are for emitting sound generated from a speaker contained at inside of the machine to outside. The coin tray 20 is for storing coins paid back from a coin payment outlet 21. Further, a prize display unit 22 indicating how much coins are to be paid back in respect of each prize is installed at the upper portion of the front face of the slot machine 1.

Further, a liquid crystal display unit 24 is installed at the front panel 2 on the right side of the respective reels 3, 4 and 5. The liquid crystal display unit 24 is a display device for displaying rotation of the reels 3, 4 and 5, displaying game history or carrying out a production in a special game.

Fig. 5 shows a circuit constitution including a control unit for controlling operation of game processing in the slot machine 1 of the embodiment and peripheral devices (actuators) electrically connected thereto.

The control unit is constituted by a microcomputer 30 as a main constituent element and circuits for random number sampling added thereto. The microcomputer 30 is constituted to include CPU 31 for carrying out control operation in accordance with previously set programs, ROM 32 and RAM 33 which are storing means. CPU 31 is connected with a clock pulse generating circuit 34 and a frequency divider 35 for generating reference clock pulses, a random number generator 36 which is random number generating means for generating random numbers in constant ranges and a random number sampling circuit 37 which is random number sampling means for sampling an arbitrary random number from generated random numbers.

As main actuators the operation of which is controlled by control signals from the microcomputer 30, there are the respective stepping motors 55 for driving to rotate the reels 3, 4 and 5, a hopper 38 for storing coins, the liquid crystal

display unit 24, a speaker 39 and the back lamps 57a, 57b and 57c. These are respectively driven by a motor drive circuit 40, a hopper drive circuit 41, a display drive circuit 42, a speaker drive circuit 43 and the lamp drive circuit 48. The drive circuits 40 through 43 and 48 are connected to CPU 31 via I/O ports of the microcomputer 30. The respective stepping motors 55 are excited in one or two phases thereof by the motor drive circuit 40 and are respectively rotated by one rotation when drive signals having 400 pulses are supplied.

Further, as input signal generating means for generating input signals necessary for the microcomputer 30 to generate control signals, there are a start switch 15S for detecting operation of the start lever 15, an inserted coin sensor 9S for detecting coins inserted from the coin slot 9 and the C/P switch 14 mentioned above. Further, there also are provided the photosensor 59 and a reel position detecting circuit 44 for detecting rotational positions of the respective reels 3, 4 and 5 by receiving output pulse signals from the photosensor 59.

The photosensor 59 generates a reset pulse by detecting the shield plate 60 at every rotation of each of the reels 3, 4 and 5. The reset pulse is inputted to CPU 31 via the reel position detecting circuit 44. RAM 33 is stored with count values in correspondence with rotational positions of the respective reels 3 through 5 in a range of one rotation and when CPU 31 receives the reset pulses, the count values formed

in RAM 33 are cleared to "0". By the clearing operation, a shift caused between display of movement of respective symbols and rotation of the respective stepping motors 55 is nullified at each rotation.

Further, as input signal generating means mentioned above, there are a reel stop signal circuit 45 and a pay completion signal generating circuit 46. The reel stop signal circuit 45 generates signals for stopping corresponding ones of the reels 3, 4 and 5 when the stop buttons 16, 17 and 18 are depressed. Further, a coin detecting unit 47 counts a number of coins paid back from the hopper 38 and the pay completion signal generating circuit 46 outputs a signal informing completion of coin payment to CPU 31 when a counted number of actually paid coins which is inputted from the coin detecting unit 47 reaches predetermined prize number data.

ROM 32 is stored with a procedure of game processing executed in the slot machine 1 as a sequential program as well as a prize probability table, a symbol table, a prize symbol combination table and so on which are respectively classified.

The prize probability table constitutes random number classifying means for classifying random numbers sampled by the sampling circuit 37 to respective prize modes and stores data for classifying random numbers in constant ranges generated by the random number generator 36 in respective prize modes. Such a prize probability table is constituted as shown in, for

example, Fig. 6. a1, a2 and a3, b1, b2 and b3, c1, c2 and c3, d1, d2 and d3, e1, e2 and e3, f1, f2 and f3 and g1, g2 and g3 in Fig. 6 are previously set numerical data and are used in classifying random numbers sampled by the sampling circuit 37 in respective prize modes. Combinations of respective numerical values are used in the data such as "a1, b1, c1, d1, e1, f1 and g1" when a number of inserting coins is 1, "a2, b2, c2, d2, e2, f2 and g2" when it is 2 and "a3, b3, c3, d3, e3, f3 and g3" when it is 3.

The numerical values are normally set in a large or small relationship of "a<b<c<d<e<f<g" and when a sampled random number value is less than a, a big hit prize (big hit) is constituted and a "BB" hit flag is erected. Further, when the sample random number value is equal to or larger than a and less than b, a medium hit prize (medium hit) is constituted and an "RB" hit flag is erected. Further, when a sampled random number values is equal to or larger than b and less than f, a small hit prize (small hit) is constituted. In this case, when it is equal to or larger than b and less than c, a "watermelon" hit flag is erected, when it is equal to or larger than c and less than d, a "bell" hit flag is erected, when it is equal to or larger than d and less than e, a "4 cherry" hit flag is erected and when it is equal to or larger than e and less than f, a "2 cherry" hit flag is erected. Further, when a sampled random number value is equal to or larger than f and less than

g, a "replay" hit flag is erected and when it is equal to or larger than g, a "blank" hit flag having no prize is erected.

That is, the prize modes are determined by to which numerical value range a sampled random number value belongs and are represented by a total of 8 kinds of hit flags including "blank" and "replay". In this case, the random number generator 36, the sampling circuit 37, the prize probability table and the microcomputer 30 constitute prize mode determining means. The various hits occur under probabilities in accordance with set data of such a prize probability table and accordingly, a total coin payment rate in, for example, business hours of one day is maintained substantially constant without being extremely controlled by the skill of the player.

Further, Fig. 7 conceptually shows a symbol table. The symbol table corresponds rotational positions of the respective reels 3 through 5 and symbols and represents columns of symbols by notations. The symbol table stores symbol codes in correspondence with code numbers for each of the reels 3 through 5. The code numbers are successively provided at respective constant rotational pitches of the reels 3 through 5 with rotational positions generating reset pulses mentioned above as references. The symbol codes designate symbols provided in correspondence with the respective code numbers.

Further, the prize symbol combination table stores symbol codes for combinations of respective prize symbols indicated at

the prize display unit 22, symbol codes for combinations of symbols constituting "reach spot" indicating the player that a flag of causing a special game is established, prize determining codes representing respective prizes, a number of sheets of coins for prize and so on. The prize symbol combination table is referred in controlling to stop the first reel 3, the second reel 4 and the third reel 5 and in confirming prize after stopping all of the reels.

Next, an explanation will be given of the operation of the game machine controlled by the microcomputer 30 according to the embodiment.

Fig. 8 and Fig. 9 are flowcharts showing an outline of game processing.

First, whether coin BET is carried out is determined by CPU 31 (refer to step 101 of Fig. 8). The determination is "YES" when a coin is inserted into the coin slot 9 and a detection signal is inputted from the coin sensor 9S or when a signal is inputted from either of the BET switches 10, 11 and 12. In that case, next, whether a start signal is inputted from the start switch 15S by operating the start lever 15 is determined (step 102).

When the determination is "YES", prize determination (probability lottery processing) is carried out by the prize mode determining means mentioned above (step 103). The timing of carrying out the prize determination is shown by a timing

chart of Fig. 10K and the prize determination is carried out when the start lever 15 is operated shown in Fig. 10J. As mentioned above, the prize is determined by to which prize group in the prize probability table a random number value generated by the random number generator 36 and specified by the sampling circuit 37 belongs.

The prize mode determined by the prize mode determining means is represented by a kind of a hit flag. According to the kind of the hit flag, there are 8 kinds of flags such as "blank", "2 cherry", "4 cherry", "bell", "watermelon", "replay", "RB" and "BB". Among the hit flags, respective flags of "2 cherry", "4 cherry", "bell" and "watermelon" are erected when a small hit prize is hit as a result of inner lottery. Further, "RB" flag is erected when a medium hit prize is hit as a result of the inner lottery and "BB" flag is erected when a big hit prize is hit as a result of the inner lottery.

Next, a processing of rotating the reels 3, 4 and 5 is carried out (step 104) and the respective reels 3 through 5 starts to rotate simultaneously in response to an operational timing of the start lever 15 in Fig. 10J as shown in Fig. 10A, Fig. 10B and Fig. 10C. Successively, the reels 3, 4 and 5 are controlled to stop (step 105) and the first reel stop button 16, the second reel stop button 17 and the third reel stop button 18 are operated in this order as shown in Fig. 10D, Fig. 10E and Fig. F, the first reel 3, the second reel 4 and the third

reel 5 are stopped at timings shown in Fig. 10A, Fig. 10B and Fig. 10C in response to timings of operating the respective stop buttons.

Further, in reel stop control explained in the embodiment, for convenience, an explanation has been given of a case in which the first reel stop button 16, the second reel stop button 17 and the third reel stop button 18 are operated in this order and the respective reels 3 through 5 are stopped in the order of the first reel 3, the second reel 4 and the third reel 5. However, the order of stopping the respective reels 3 through 5 is not limited thereto but, for example, the reels may be stopped by a random operational order as in the first reel stop button 16, the third reel stop button 18 and the second reel stop button 17.

The reel stop control is carried out in accordance with the kind of a hit flag which has been set as a result of the prize determination. That is, when the hit flag is "blank", the motor drive circuit 40 is controlled by CPU 31, and the respective reels 3 through 5 are controlled to stop such that no prize combination of symbols is set on any of the effective prize lines.

Further, when the hit flag is "2 cherry", the motor drive circuit 40 is controlled by CPU 31 and the respective reels 3 through 5 are controlled to stop such that a combination of symbols of "cherry" is set on any of the effective prize lines.

Further, when the hit flag is "4 cherry", a combination of symbols of "cherry" is set respectively on two of the effective prize lines. Further, when the hit flag is "bell" or "watermelon", the respective reels 3 through 5 are controlled to stop such that a combination of symbols "bell" or "watermelon" is set on any of the effective prize lines.

Further, when the hit flag is "RB" or "BB", the respective reels 3 through 5 are controlled to stop such that a combination of symbols of "7" or predetermined character symbols is set on any of the effective prize lines.

Next, whether a special game prize hit flag, that is, "RB" hit flag or "BB" hit flag is erected as a result of the probability lottery processing at step 103 is determined (step 106). When the special game prize hit flag is erected, successively, a processing of controlling to wink reel lamps (step 107) is carried out. Further, when the special game hit prize flag is not erected, the processing proceeds to step 108 mentioned later. In the reel lamp winking control processing at step 107, the lamp drive circuit 48 is controlled by CPU 31 and the respective back lamps 57a, 57b and 57c of the respective reels 3 through 5 are light-on controlled such that the respective back lamps are made to wink in a predetermined display mode. In this case, the lamp drive circuit 48, the respective back lamps 57a, 57b and 57c and the microcomputer 30 constitute informing means for informing a prediction of the

special game prize.

For example, when the special game prize hit flag is "BB" hit flag, the respective back lamps 57a, 57b and 57c are light-on controlled by a display mode shown in Figs. 11A through 11F at timings shown in Figs. 10G through 10I.

That is, the back lamp 57a at the upper column of the second reel 4 is lighted on as shown in Fig. 11A at a timing of stopping the third reel 5 shown in Fig. 10C where all of the reels 3 through 5 are stopped. Thereafter, as shown in Fig. 11B, the back lamp 57b at the middle column of the second reel 4 is lighted on and as shown in Fig. 11C, the back lamp 57c at the lower column of the second reel 4 is lighted on. Timings of lighting on the lamps until the current time are shown by "a", "b" and "c" in Fig. 10H. Successively, as shown in Fig. 11D, the respective back lamps 57c at the respective lower columns at the first reel 3 and the third reel 5 are lighted on and as shown in Fig. 11E, the respective back lamps 57b at the respective middle columns of the first reel 3 and the third reel 5 are lighted on. Finally, as shown in Fig. 11F, the respective back lamps 57a of the respective upper columns of the first reel 3 and the third reel 5 are lighted on. The timings of lighting on these are respectively shown by "c", "b" and "a" of Fig. 10G and Fig. 10I.

Further, when the special game prize hit flag is "RB" hit flag, the respective back lamps 57a, 57b and 57c are light-on

controlled by a display mode shown in Figs. 12A through 12E.

That is, at the timing of stopping all the reels 3 through 5, all the back lamps 57a, 57b and 57c of the respective reels 3 through 5 are lighted as shown in Fig. 12A. Successively, the back lamp 57b at the middle column of the first reel 3 is extinguished as shown in Fig. 12B. Thereafter, as shown in Fig. 12C, the back lamp 57b at the middle column of the second reel 4 is extinguished and successively, the back lamp 57b at the middle column of the third reel 5 is extinguished as shown in Fig. 12D. Finally, as shown in Fig. 12E, all the back lamps 57a, 57b and 57c of the respective reels 3 through 5 are lighted on.

The reel stop control at step 105 of Fig. 8 is not totally carried out by the machine but timings of operating the respective stop buttons 16 through 18 by the player matter. That is, even when a prize hit flag is erected as a result of inner lottery, unless the stop buttons 16 through 18 are operated by the player, a prize combination of symbols is not set on the effective prize line and prize is not awarded.

Therefore, successively, whether display in stopping the reels constitutes a predetermined prize combination of symbols is determined in reference to the prize symbol combination table (step 108). When the prize is not obtained, the determination is "NO" and the processing returns to the initial step 101. Further, when replay game (replay) is constituted as a result of determination of prize, the processing returns to a

processing awaiting for operation of the start lever 15 at step 102 (step 109). In the case of a prize which is not replay game, the hopper drive circuit 41 is controlled by CPU 31 and a predetermined number of coins are paid back to the coin tray 20 (step 111 of Fig. 9).

For example, in the case of the small hit prize of "2 cherry", 2 coins are paid back and in the case of the small hit prize of "4 cherry", 4 coins are paid back. Further, in the case of the small hit prize of "bell", 6 coins are paid back and in the case of the small hit prize of "watermelon", 8 coins are paid back. Further, in the case of the big hit prize of "BB" or "RB", 15 coins are paid back, respectively.

Next, whether BB game occurs is determined (step 112) and when the BB game occurs, the BB game is executed (step 113). According to the BB game, a set of general game and bonus game can be carried out by a plurality of times. In the general game in BB game, the small hit prize is awarded at a high probability. Further, a bonus game is a game comprising a set of high prize games at a plurality of times. When BB game is not caused, successively, whether RB game is caused is determined (step 114) and when RB game occurs, the RB game is executed (step 115). According to the RB game, the above-described bonus game can be carried out by once.

Thereafter, the slot machine game is carried out by repeating the above-described processings.

According to the embodiment, the respective back lamps 57a, 57b and 57c installed on the rear side of the respective rotating reels 3 through 5 are light-on controlled in a predetermined display mode by informing means after stopping all the reels 3 through 5 and the special game prize is informed to the player. For example, winning of the "BB" hit flag is informed to the player by light-on control of the respective back lamps 57a, 57b and 57c in the display mode shown in Figs. 11A through 11F and winning of the "RB" hit flag is informed to the player by light-on control of the respective back lamps 57a, 57b and 57c by the display mode shown in Figs. 12A through 12E. Therefore, different from the conventional slot machine in which the special game prize mode is informed by simply lighting on lamps installed at the front panel, the special game prize is informed with ornamental performance higher than that in the conventional case.

Further, the light-on control is carried out in a wide area using all of the reel windows 6 through 8 in front of the player and therefore, the special game prize is caught by visual sense of the player with strong impact and the player can taste further strongly actual feeling of pleasure of the special game prize. Further, the player expects that the light-on control which is visually pleasant emerges after stopping all the rotating reels at each game. As a result, the tastefulness of the slot machine game is enhanced.

Further, although in the above-described embodiment, the respective back lamps 57a, 57b and 57c are light-on controlled by the display modes shown in Figs. 11A through 11F and Figs. 12A through 12E and winning of the respective hit flags of "BB" and "RB" is informed to the player, the back lamps 57a, 57b and 57c may be light-on controlled by display modes shown in Figs. 13A through 13E, Figs. 14A through 14E and Figs. 15F through 15I and the special game prize may be informed to the player.

That is, when the special game prize hit flag is the "BB" hit flag, the respective back lamps 57a, 57b and 57c are light-on controlled by a display mode shown in Figs. 13A through 13E. First, at a timing at which all the reels 3 through 5 are stopped, the back lamps 57a and 57c at the upper column and the lower column of the second reel 4 are lighted on as shown in Fig. 13A. Thereafter, as shown in Fig. 13B, the back lamp 57a at the upper column of the first reel 3 and the back lamp 57c at the lower column of the third reel 5 are lighted on, successively, as shown in Fig. 13C, the respective back lamps 57b at the middle columns of the first reel 3 and the third reel 5 are lighted on. Successively, as shown in Fig. 13D, the back lamp 57c at the lower column of the first reel 3 and the back lamp 57a at the upper column of the third reel 5 are lighted on and finally, as shown in Fig. 13E, the back lamps 57a and 57c at the upper column and the lower column of the second reel 4 are lighted on.

Further, when the special game prize hit flag is the "RB" hit flag, the respective back lamps 57a, 57b and 57c are light-on controlled by a display mode shown in Figs. 14A through 14E and Figs. 15F through 15I. First, at a timing of stopping all the reels 3 through 5, all the back lamps 57a, 57b and 57c of the respective reels 3 through 5 are once lighted on as shown in Fig. 14A. Successively, the respective back lamps 57b at the middle columns of the first reel 3, the second reel 4 and the third reel 5 are extinguished as shown in Fig. 14B, Fig. 14C and Fig. 14D. Thereafter, as shown in Fig. 14E, all the back lamps 57a, 57b and 57c of the reels 3 through 5 are lighted on. Further, as shown in Fig. 15F, Fig. 15G and Fig. 15H, the respective back lamps 57b at the middle columns of the first reel 3, the second reel 4 and the third reel 5 are successively extinguished and finally, as shown in Fig. 15I, all the back lamps 57a, 57b and 57c of the respective reels 3 through 5 are lighted on.

An effect similar to that in the above-described embodiment can be achieved also by such display modes.

Next, an explanation will be given of a second embodiment in which a game machine according to the present invention is applied to a slot machine.

The constitution of the slot machine according to the embodiment differs from the constitution of the slot machine according to the first embodiment mentioned above in respect of

the following points and other constitution is the same as that of the slot machine according to the above-described embodiment.

That is, according to the slot machine of the above-described embodiment, when the special game prize is selected by lottery in the probability lottery processing (step 103 of Fig. 8), the special game prize is necessarily informed to the player by the informing means. However, according to the slot machine of this embodiment, even when the special game prize is selected by lottery by the probability lottery processing, the special game prize is not necessarily informed to the player. Further, even when a prize mode other than the special game prize is determined by the prize mode determining means, there is a case in which a prediction of the special game hit is informed.

A detailed description will be given of the slot machine according to the embodiment as follows.

According to the slot machine of the embodiment, ROM 32 is stored with a prize mode informing selection lottery probability table. The prize mode informing selection lottery probability table is referred when a prize mode determined by the prize mode determining means is informed to the player at a predetermined probability.

The prize mode informing selection lottery probability table exemplified in Fig. 16 is shown in correspondence with the probability table of 3 coins betting in the prize mode

probability table shown in Fig. 6. That is, at upper columns of the prize mode informing selection lottery probability table, respective values of the numerical data a3, b3, c3, d3, e3, f3 and g3 which are hit section data in 3 coins betting are shown. Further, respective values of information section data in general game of 3 coins betting are shown at lower columns thereof. In this case, the random number generator 36 generates random numbers in a range of 0 through 65535 ($=2^{16}$).

According to the table, when a random number in a range of 0 through 200 is sampled by the sampling circuit 37 in determining a prize, a result of inner lottery constitutes a big hit prize and the "BB" hit flag is erected, and when a random number in a range of 201 through 380 is sampled by the sampling circuit 37, a result of inner lottery constitutes a medium hit prize and the "RB" hit flag is erected. Similarly, when random numbers in a range of 381 through 10000 are sampled, small prize hit flags of respective modes are erected, when a random number in a range of 10001 through 18000 is sampled, the "replay" hit flag is erected and when a random number in a range of 18001 through 65535 is sampled, the "blank" hit flag is erected.

Further, when a random number in a range of 0 through 150 or 20000 through 20200 is sampled by the sampling circuit 37 in determining a prize, a prediction of the "BB" hit flag is informed. That is, when a random number in a range of 0 through

150 is sampled and the "BB" hit flag is erected, the special game prize mode of the "BB" hit flag is informed. Further, even when a random number in a range of 20000 through 20200 is sampled and the "blank" hit flag is erected, the special game prize mode is informed. Meanwhile, even when a random number in a range of 151 through 200 is sampled and the "BB" hit flag is erected, the random number in this range is out of the range of the classified informing data of the "BB" hit flag and therefore, the special game prize mode is not informed.

That is, even when the special game prize mode is informed, the "BB" hit flag or the "RB" hit flag is not necessarily erected by the inner lottery, further, even when the special game prize mode is not informed, it is not always established that the "BB" hit flag or the "RB" hit flag is not erected by inner lottery. The special game prize is informed under a predetermined reliability and in the case of the table shown in Fig. 16, when the "BB" hit flag is erected, the probability of informing the prize mode is 151/352 {(151 of 0 through 150)/(a sum of 151 of 0 through 150 and 201 of 20000 through 20200)}, or about 43 %. Further, when the "BB" hit flag is not erected, the probability of informing the prize mode is 201/352 or about 57 %. As a result, the prize mode informing operation is missed at the probability of about 57 %.

Next, an explanation will be given of the game processing according to the embodiment in reference to a flowchart shown

in Fig. 17.

Steps 121 through 123 of the flowchart are the same as steps 101 through 103 of the flowchart shown in Fig. 8 according to the first embodiment and first, presence or absence of coin BET is determined by CPU 31 (step 121). When coin BET is carried out, successively, whether the start lever 15 is operated is determined (step 122) and when the start lever is operated, the prize mode is determined by the probability lottery processing mentioned above (step 123).

Next, an informing selection lottery processing of the prize mode is carried out (step 124) after carrying out the probability lottery processing. The timing of the informing selection lottery is set immediately after the timing of the probability lottery exemplified in Fig. 10K. As mentioned above, the informing selection lottery processing of the prize mode is carried out by using the informing selection lottery probability table exemplified in Fig. 16 and is carried out by determining to which classification of the classified informing data of the probability table a random number value specified by the sampling circuit 37 in determining the prize, belongs. A result of the informing selection lottery is also written to a predetermined region of RAM 33 and when the prize mode is informed as a prediction, an informing flag is set at step 124. The set informing flag also represents a kind of the informed prize mode.

Next, reel rotating processing (step 125) and reel stop control processing (step 126) are carried out as mentioned above.

Next, whether a special game prize informing flag is erected by the informing selection lottery processing at step 124, that is, whether the sampled random value is a value belonging to data of the special game prize informing classification, is determined (step 127). When the sampled random value belongs to data of the special game prize informing classification and the special game informing flag, that is, the informing flag of "BB" or "RB" is erected, successively, the reel lamp winking control processing (step 128) is carried out. Further, when the special game prize informing flag is not erected, the processing proceeds to step 129.

The reel lamp winking control at step 128 is carried out similar to the reel lamp winking control in the first embodiment and a prediction of the special game prize is informed. Although according to the first embodiment mentioned above, the flag which is referred when the prediction of the special game prize is informed is the special game prize hit flag, according to the embodiment, in informing the prediction, the special game prize informing flag is refereed. Therefore, as mentioned above, the special game prize is informed under a predetermined reliability, the informing may be hit or may be

missed. Further, even when the blank prize mode is determined by the prize mode determining means, the prediction of the special game prize may be informed.

Next, whether the display in stopping the reels constitutes a predetermined prize combination of symbols is determined in reference to the prize symbol combination table (step 129). When the prize is not gained, the processing returns to the initial step 121 and when the result of prize determination is reply game, the processing returns to the processing of awaiting for operation of the start lever 15 at step 122 (step 130).

The following processings are carried out similarly in accordance with steps 111 through 115 of the flowchart shown in Fig. 9 and explained in the first embodiment.

According to the embodiment, the special game prize is not informed in respect of all the result of inner lottery but is informed at a predetermined probability shown by the informing selection lottery probability table (refer to Fig. 16). Therefore, the special game prize may be informed to the player or may not be informed thereto. Further, even when a prize mode other than the special game prize is determined by the prize mode determining means, the special game prize may be informed at a predetermined probability. Therefore, information of the special game prize is expected by the player and when the special game prize is informed, the pleasure is enhanced and

the tastefulness of the game is further promoted.

Further, in explaining the above-described embodiment, an explanation has been given of the constitution in which the prediction of the special game prize mode is informed even when the "blank" prize mode is determined by the prize mode determining means, there may be constructed a constitution in which when a prize mode other than the special game prize is determined, the prediction of the special game prize mode may not be informed and only when the special game prize mode is determined, the prediction may be informed at a predetermined probability.

Further, although in the above-described respective embodiments, an explanation has been given of a case in which the game machine is applied to a slot machine, the present invention is not limited thereto but is applicable to, for example, a pinball game machine such as a pachinko machine or other amusement machines.

An effect similar to that of the above-described respective embodiments is achieved even with such respective constitutions.

When the present invention is applied to a pachinko machine, a flow of game such as start lever operation, operation of sampling a random number for determining a prize mode and operation of starting to rotate the reels in the slot machines of the above-described respective embodiments, is

replaced by a flow of game such as prize hit of pachinko balls to a specified prize slot, operation of sampling a random number for determining a prize mode, operation of starting to rotate slot machine reels integrated to the pachinko machine. Further, payment operation of coins which is carried out when symbols of the reels are stopped and displayed by a specified mode in the slot machines of the above-described respective embodiments, is replaced by rewarding a special prize in pachinko game such as opening a variable prize device of attacker or tulip to thereby provide the player with a number of balls in the pachinko machine.

Although the present invention has been explained in reference to the embodiments, it is apparent for those skilled in the art that many changes and modifications can be made without departing from the spirit and scope of the invention, as clear from the following claims.

For the purposes of this specification it is to be clearly understood that the word "comprising" means "including but not limited to", and that the word "comprises" has a corresponding meaning.

AUSTRALIAN PATENT OFFICE

WHAT IS CLAIMED IS:

1. A game machine comprising:

prize mode determining means for determining a prize mode of game by random number lottery;

a plurality of rotating reels outer peripheries of which are illustrated with various patterns for stopping and displaying a combination of the patterns in accordance with the prize mode determined by the prize mode determining means; and

a plurality of light sources installed to the respective rotating reels for illuminating the patterns stopped and displayed by the respective rotating reels from a rear side, further comprising:

informing means for informing a player that the prize mode of a special game is determined by the prize mode determining means by light-on control of the respective light sources in a predetermined display mode under a condition of stopping all of the respective rotating reels.

2. The game machine according to Claim 1:

wherein the informing means informs the player at a predetermined probability that the prize mode of the special game is determined by the prize mode determining means.

3. The game machine according to Claim 2:

wherein the informing means informs the special game prize mode to the player at a predetermined probability when a prize mode other than the special game is determined by the prize

mode determining means.

4. The game machine according to Claim 3, further comprising informing mode selecting means for selecting informing information; and

wherein the informing means informs the informing information selected by the informing mode selecting means to the player at a predetermined probability.

5. The game machine according to Claim 4:

wherein the informing mode selecting means selects the prize mode to be informed in reference to an informing selection lottery probability table comprising data classifying random numbers selected by lottery in accordance with respective informing modes and selects the informing information in accordance with the prize mode.

6. The game machine according to Claim 1 or Claim 3, wherein the prize mode determining means comprising:

random number generating means for generating random numbers in constant ranges;

random number sampling means for sampling an arbitrary random number from the random numbers generated by the random number generating means; and

random number classifying means for classifying the random number sampled by the random number sampling means in accordance with the respective prize modes.

7. The game machine according to Claim 1 or Claim 3:

Wherein the prize mode of the special game is an inner prize mode of either a big hit or a medium hit.

8. The game machine according to Claim 1 to Claim 3:

wherein the game machine is either a slot machine or a pinball machine.

9. A game machine substantially as herein described with reference to the examples and/or the accompanying drawings.

Dated this 2nd day of December 1998

ARUZE CORPORATION

By their Patent Attorneys

GRIFFITH HACK

Fig. 1

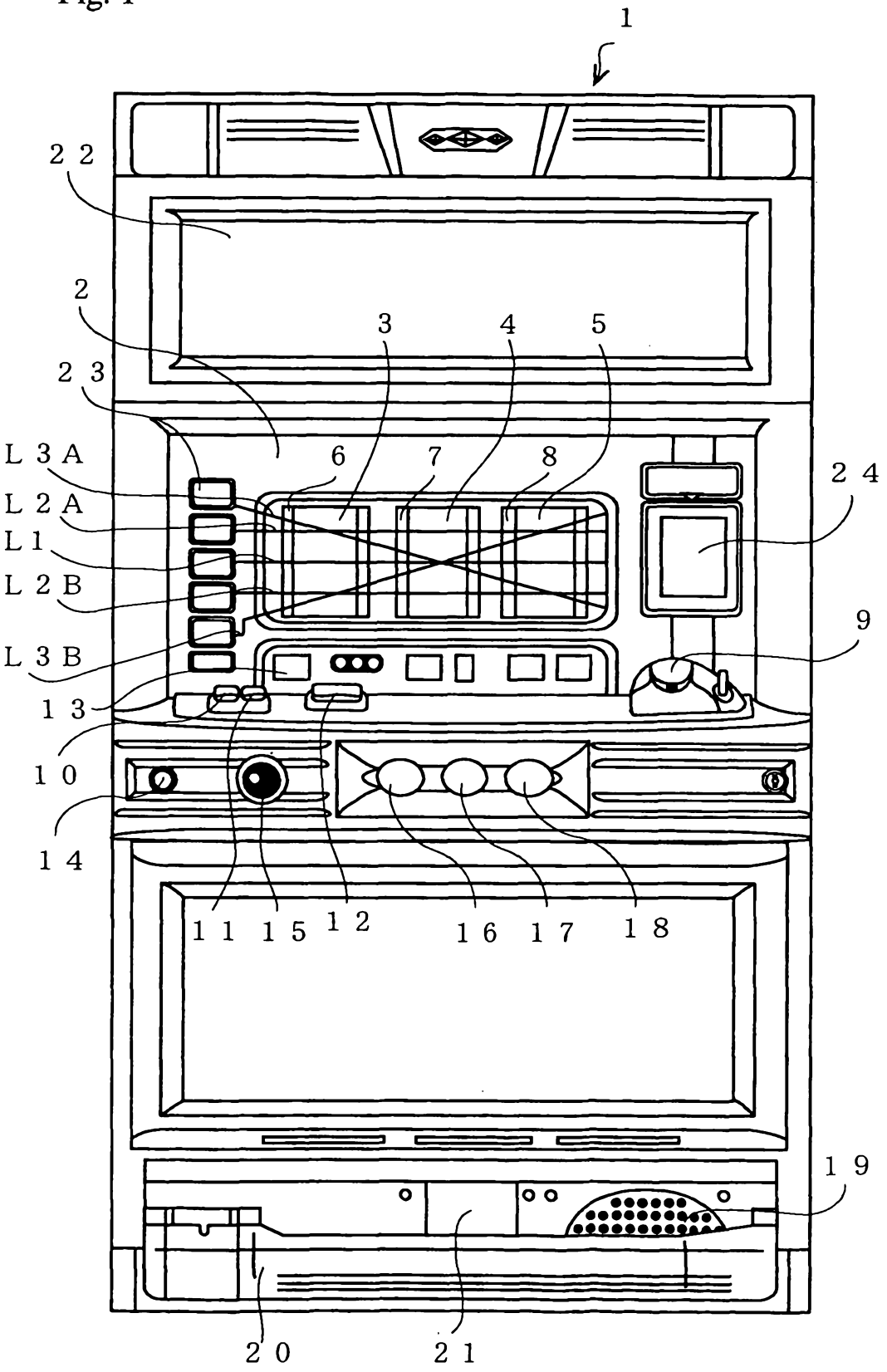

1
2 2
2
3
4
5
2 3
L 3 A
L 2 A
L 1
L 2 B
L 3 B
1 3
1 0
1 4
6
7
8
2 4
9
1 1
1 5
1 2
1 6
1 7
1 8
1 9
2 0
2 1

Fig. 2

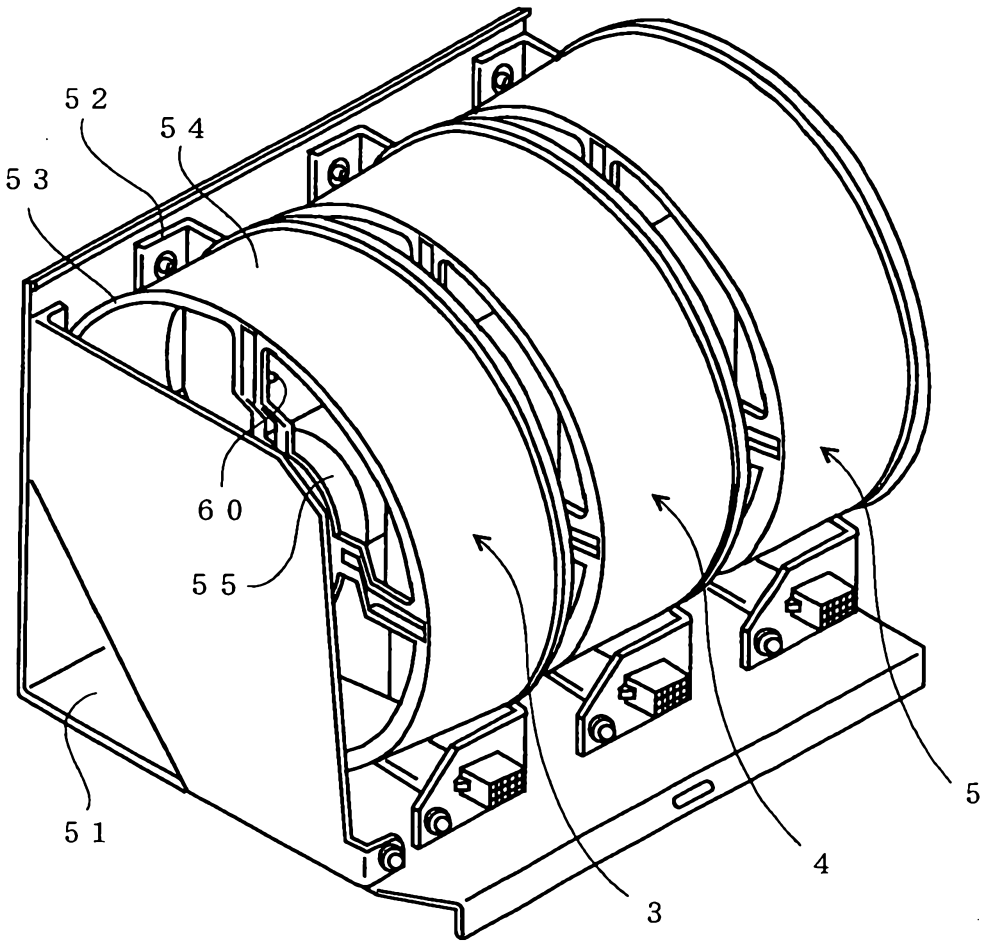


Fig. 3A

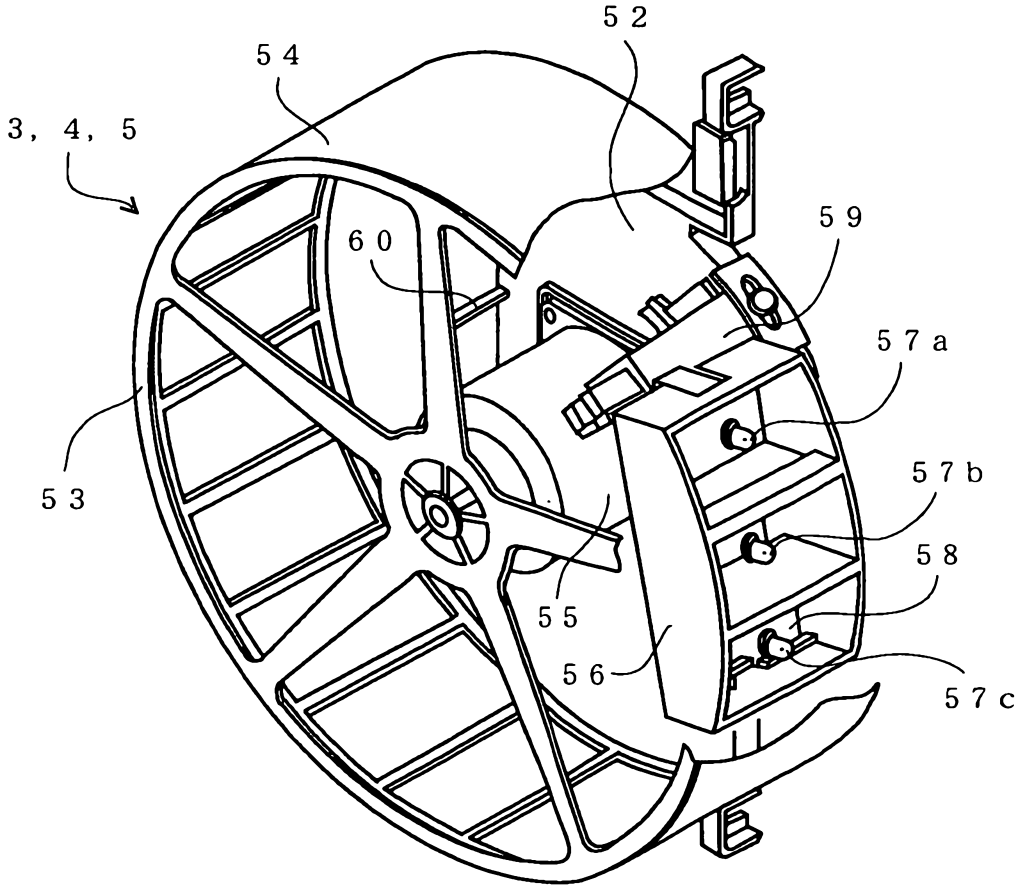


Fig. 3B

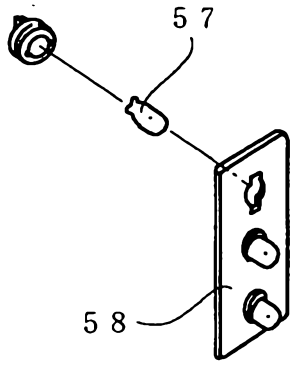


Fig. 4A

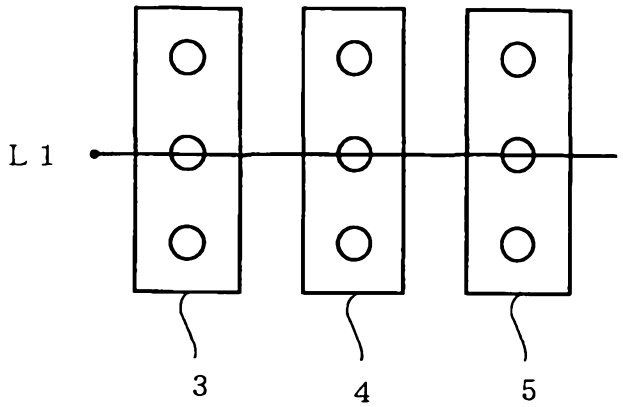


Fig. 4B

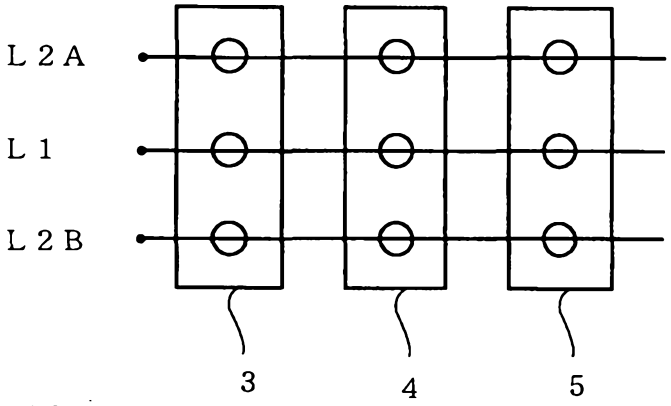


Fig. 4C

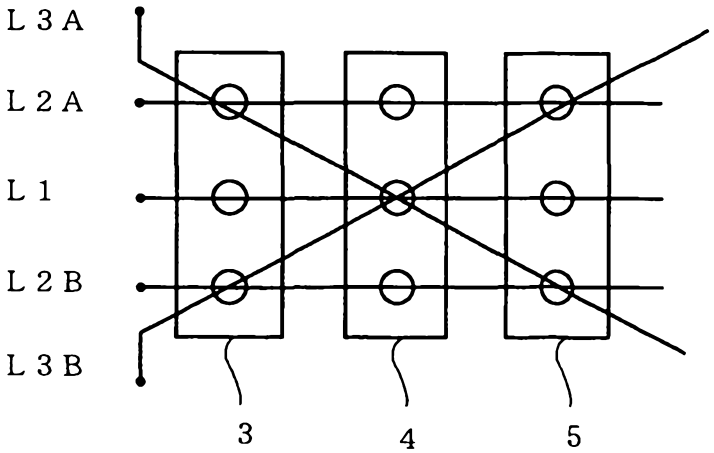


Fig. 5

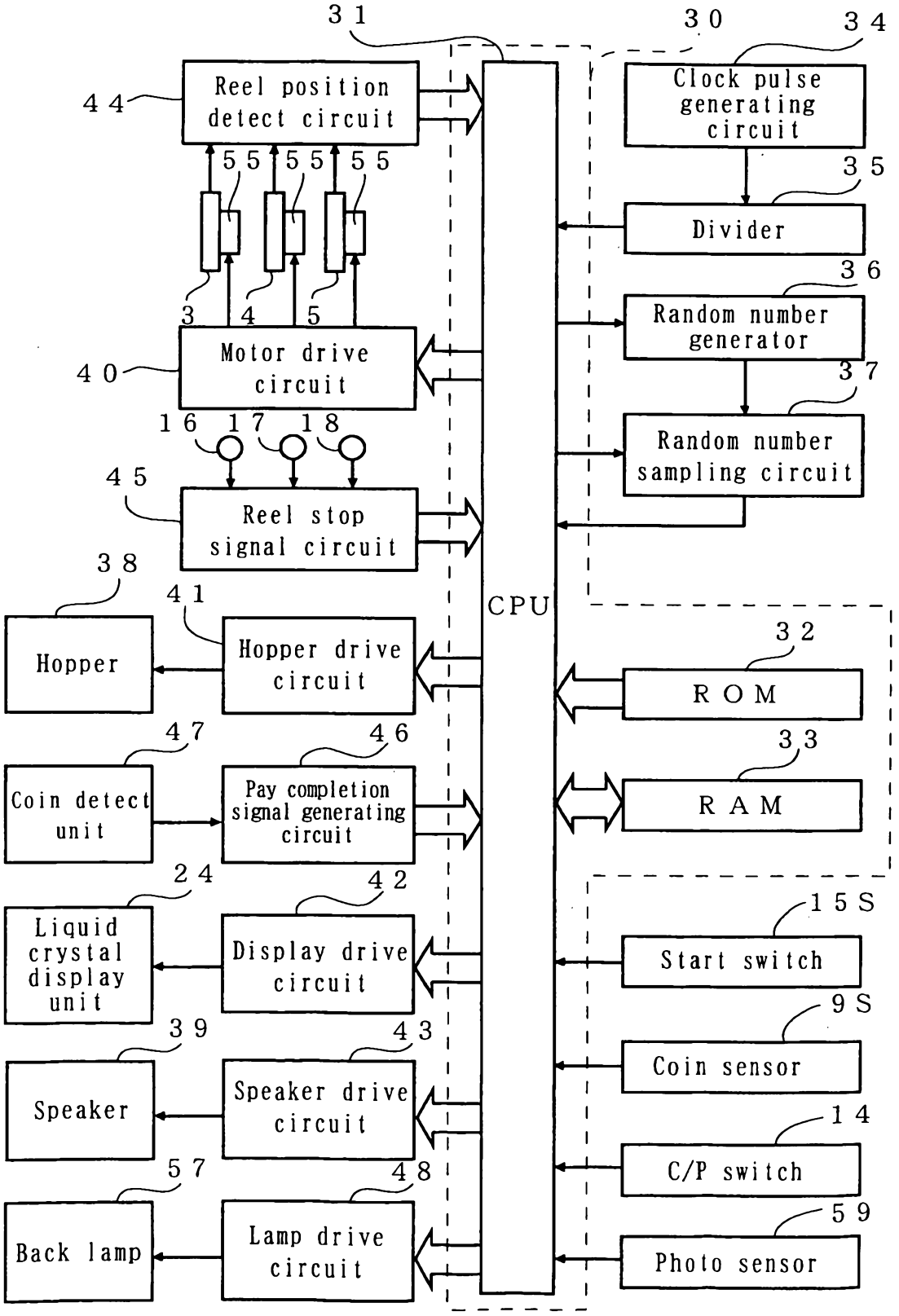

31
30
34
Reel position detect circuit
44
Clock pulse generating circuit
55
55
55
35
Divider
3
4
5
36
Random number generator
Motor drive circuit
40
37
16
17
18
Random number sampling circuit
45
Reel stop signal circuit
38
41
CPU
Hopper
Hopper drive circuit
32
ROM
47
46
33
Coin detect unit
Pay completion signal generating circuit
RAM
24
42
15S
Liquid crystal display unit
Display drive circuit
Start switch
9S
39
43
Coin sensor
Speaker
Speaker drive circuit
14
C/P switch
57
48
59
Back lamp
Lamp drive circuit
Photo sensor

Fig. 6

Hit / No. of coins	Big	Medium	Small				
	BB	RB	Water melon	Bell	4 Cherry	2 Cherry	Replay
1	a 1	b 1	c 1	d 1	e 1	f 1	g 1
2	a 2	b 2	c 2	d 2	e 2	f 2	g 2
3	a 3	b 3	c 3	d 3	e 3	f 3	g 3

Fig. 7

Code No.	#1 reel	#2 reel	#3 reel
0	A	E	B
1	G	C	H
2	F	D	F
3	C	G	E
4	F	D	F
5	A	A	A
6	D	E	E
7	C	G	F
8	G	D	D
9	F	E	F
10	C	B	H
11	F	D	B
12	A	E	F
13	E	D	E
14	C	A	F
15	F	E	H
16	B	G	C
17	F	D	F
18	C	B	D
19	E	F	E
20	F	D	F

Fig. 8

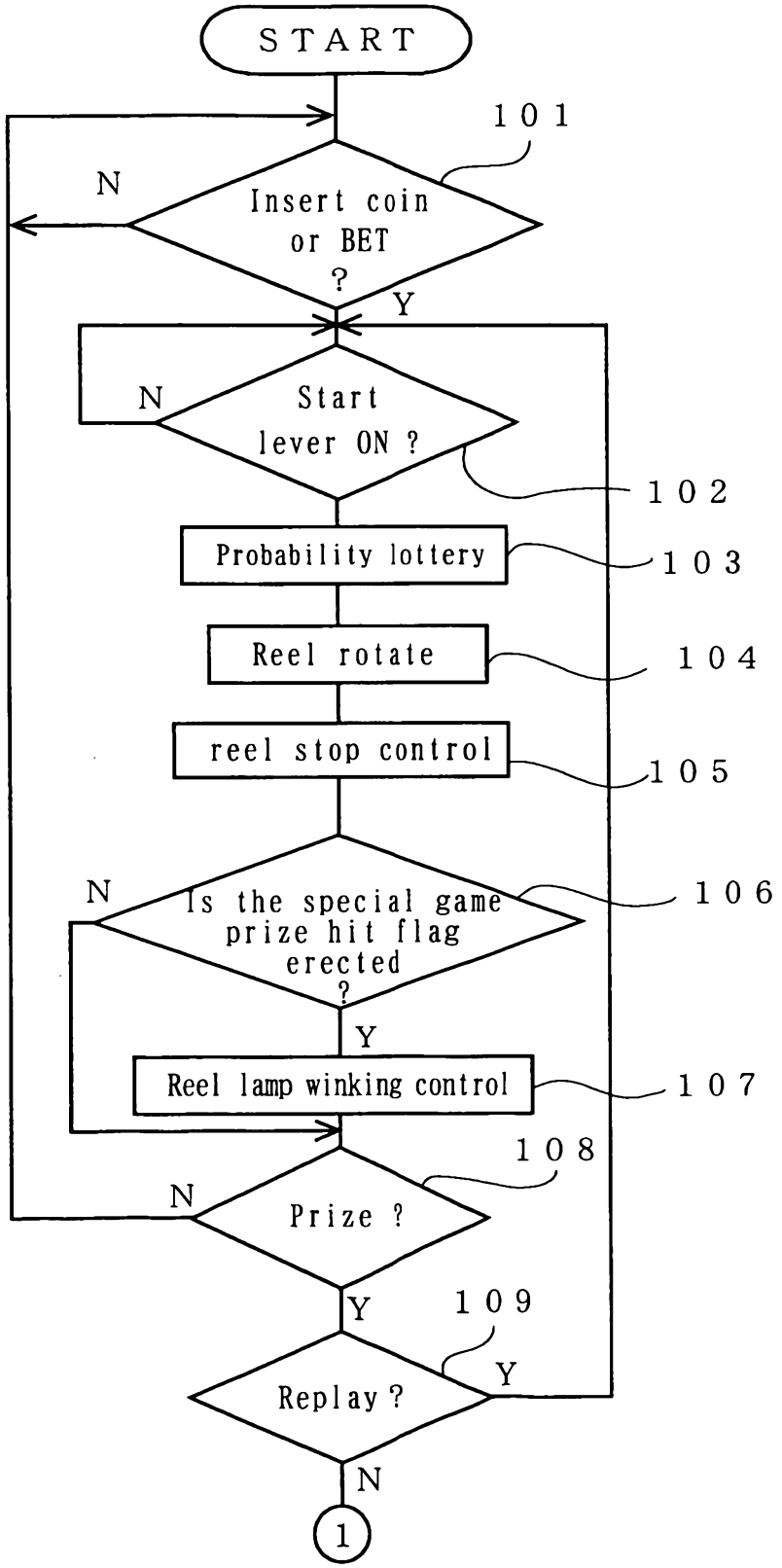

START
101
Insert coin or BET ?
N
Y
Start lever ON ?
N
102
Probability lottery
103
Reel rotate
104
reel stop control
105
Is the special game prize hit flag erected ?
N
106
Y
Reel lamp winking control
107
108
Prize ?
N
Y
109
Replay ?
Y
N
1

Fig. 9

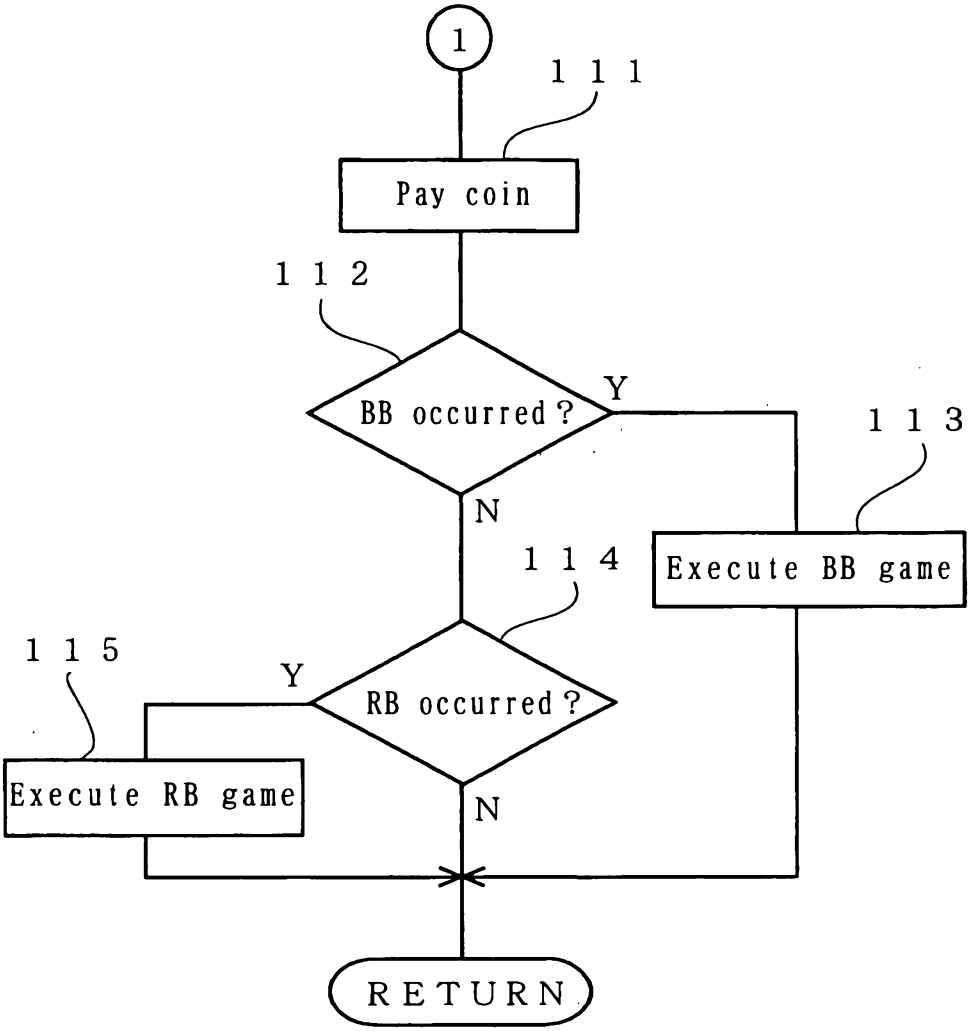

1
1 1 1
Pay coin
1 1 2
BB occurred ?
Y
N
1 1 3
Execute BB game
1 1 4
RB occurred ?
Y
N
1 1 5
Execute RB game
RETURN

Fig. 10A #1 reel

Fig. 10B #2 reel

Fig. 10C #3 reel

Fig. 10D #1 reel stop button

Fig. 10E #2 reel stop button

Fig. 10F #3 reel stop button

Fig. 10G #1 reel back lamp

Fig. 10H #2 reel back lamp

Fig. 10I #3 reel back lamp

Fig. 10J Start lever

Fig. 10K Lottery timing

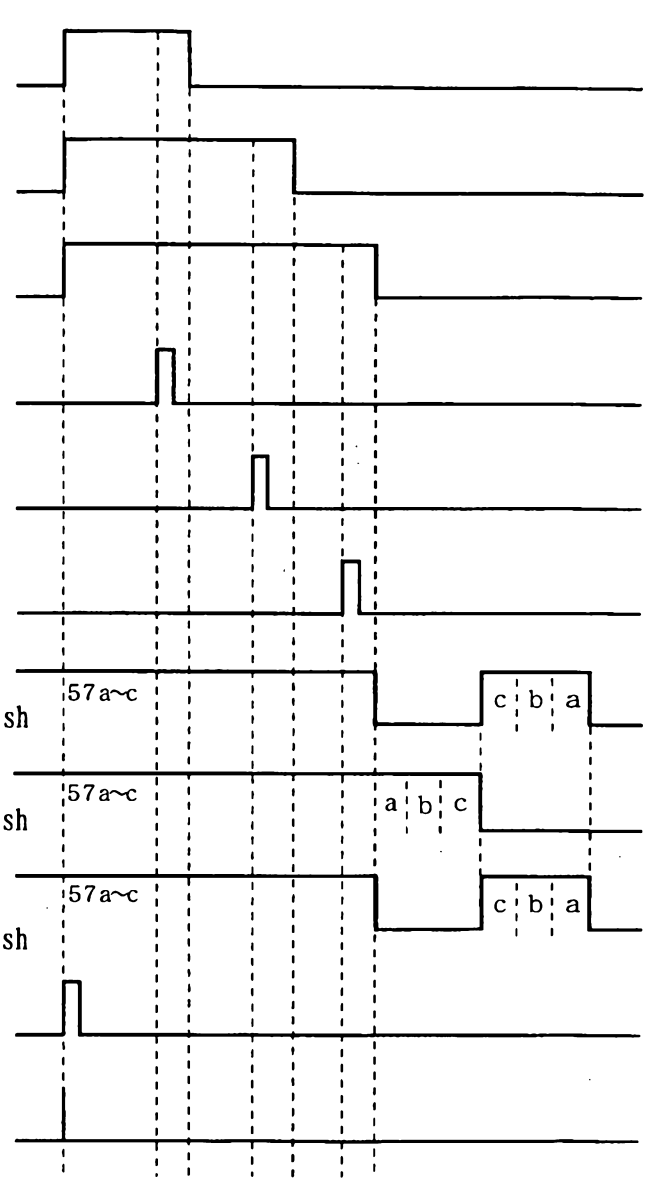


Fig. 11A

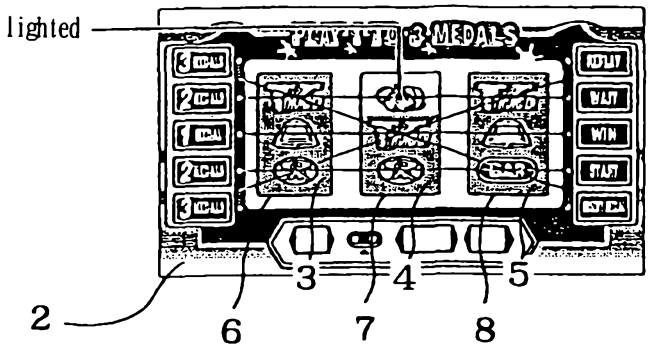


Fig. 11B

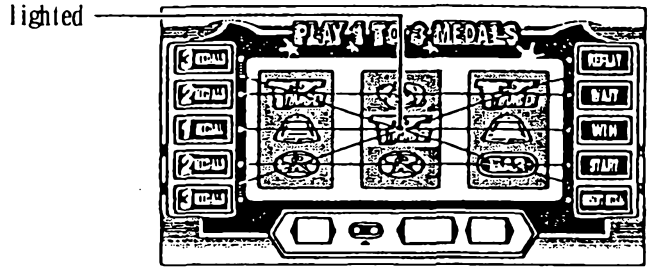


Fig. 11C

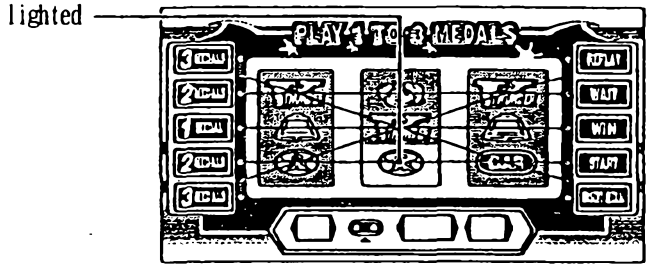


Fig. 11D

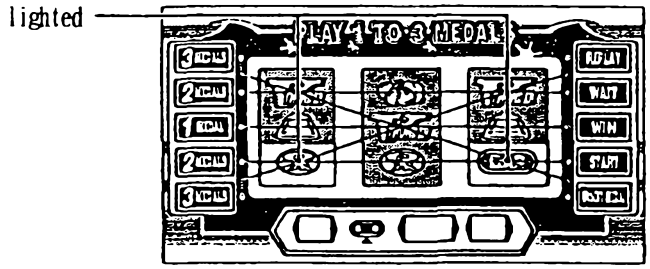


Fig. 11E

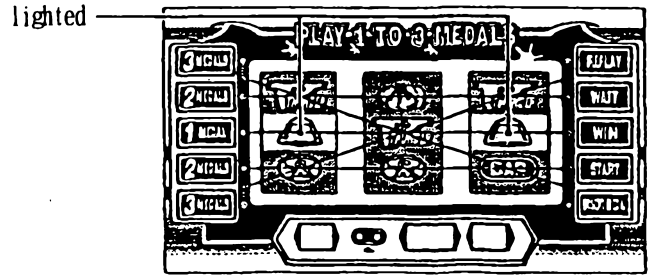


Fig. 11F

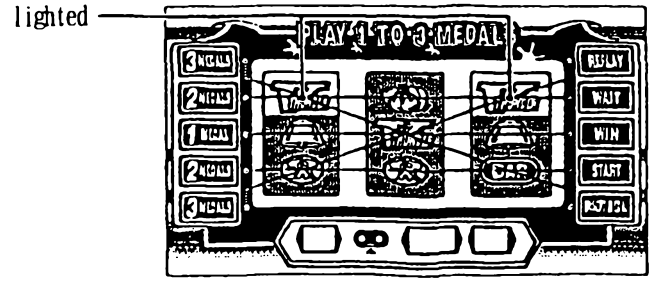


Fig. 12A

all lighted

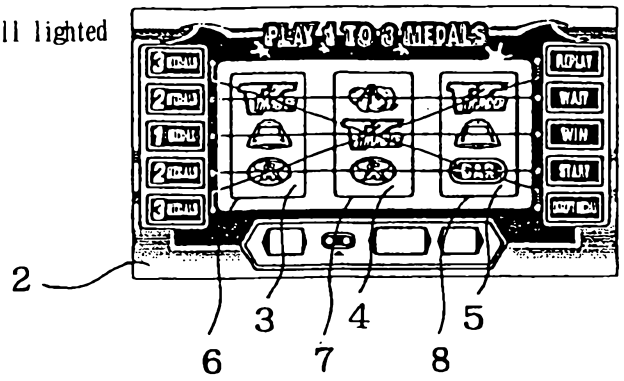


Fig. 12B

extinguished

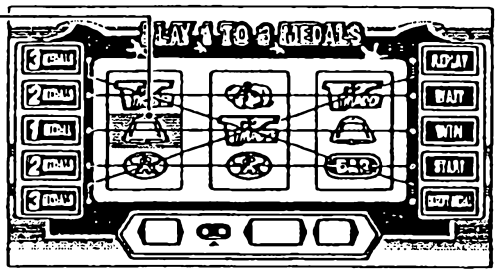


Fig. 12C

extinguished

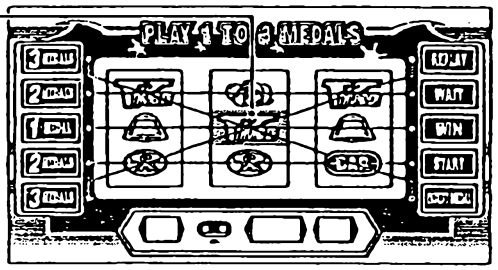


Fig. 12D

extinguished

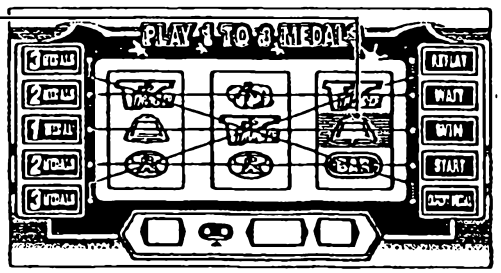


Fig. 12E

all lighted

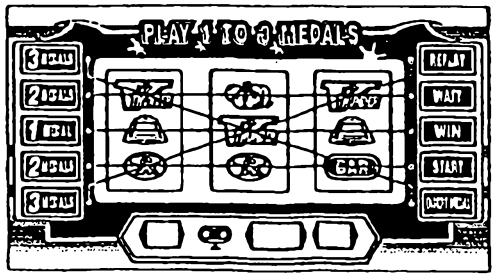


Fig. 13A

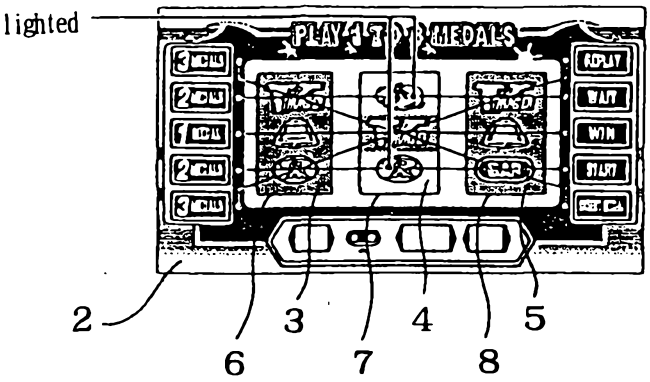


Fig. 13B

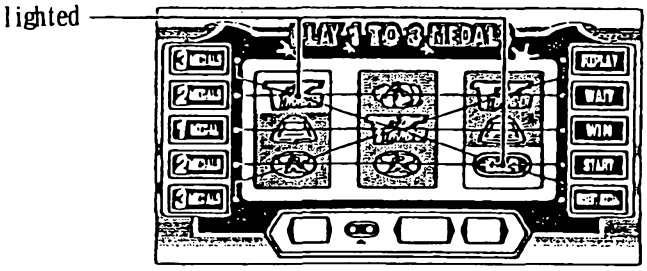


Fig. 13C

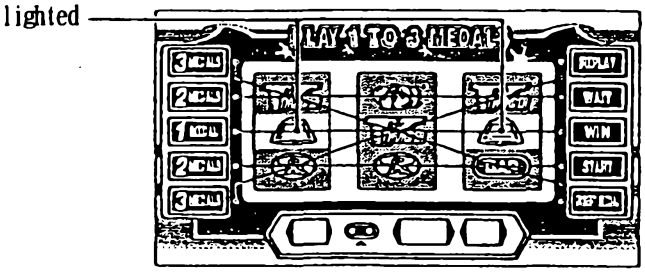


Fig. 13D

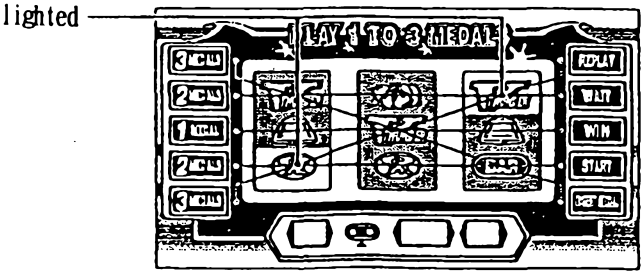


Fig. 13E

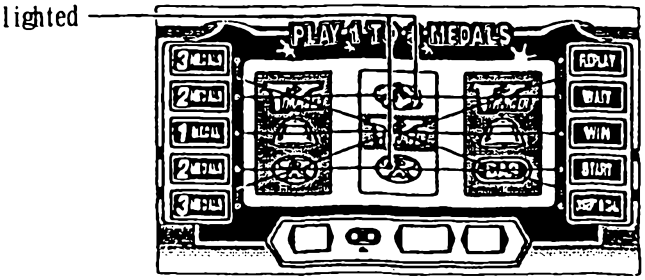


Fig. 14A

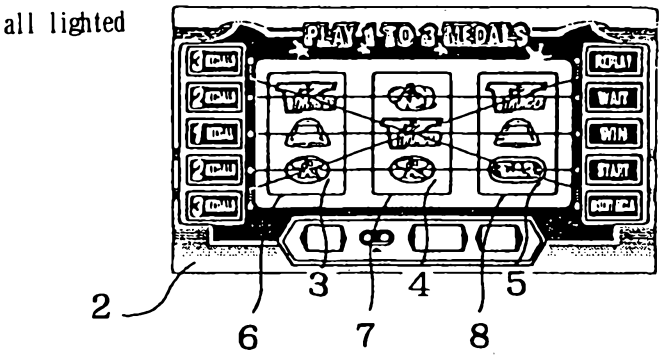


Fig. 14B

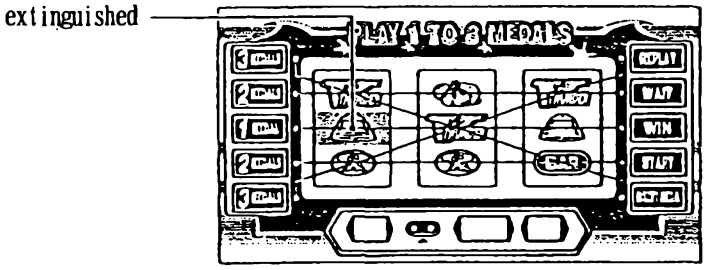


Fig. 14C

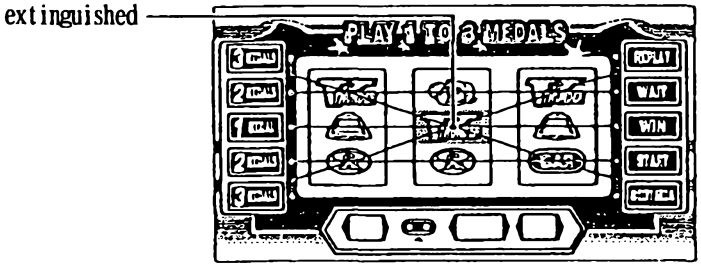


Fig. 14D

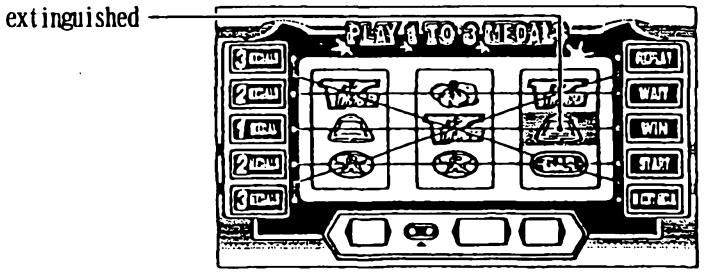


Fig. 14E

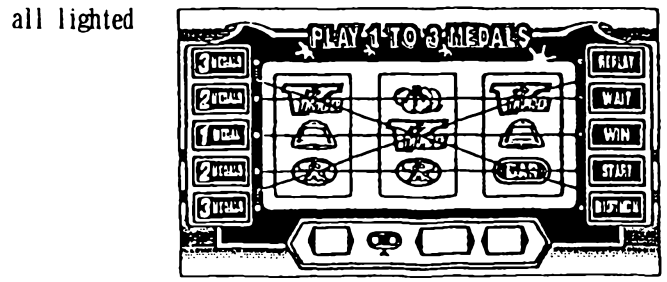


Fig. 15F

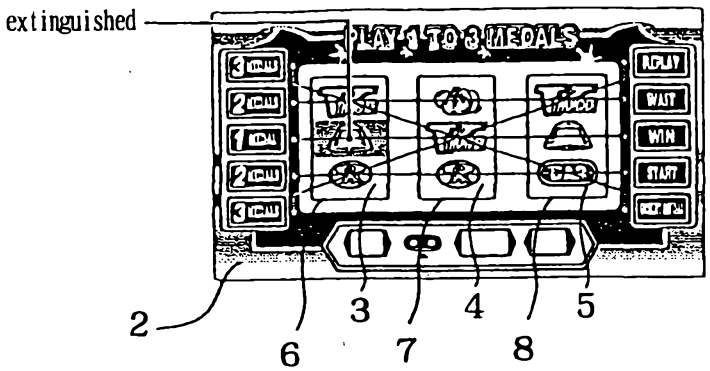


Fig. 15G

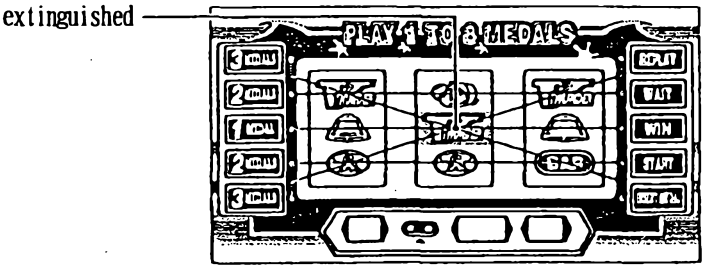


Fig. 15H

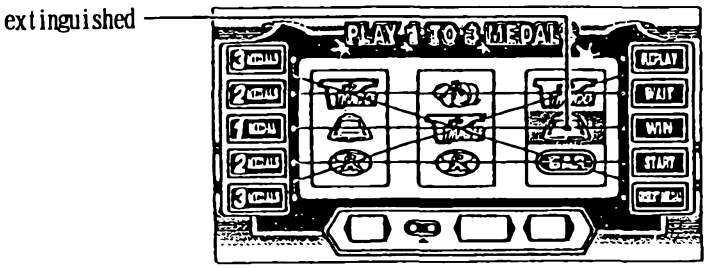
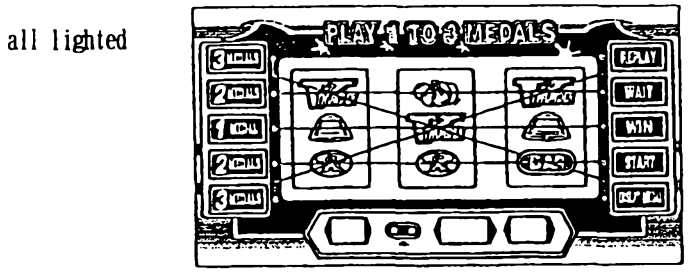


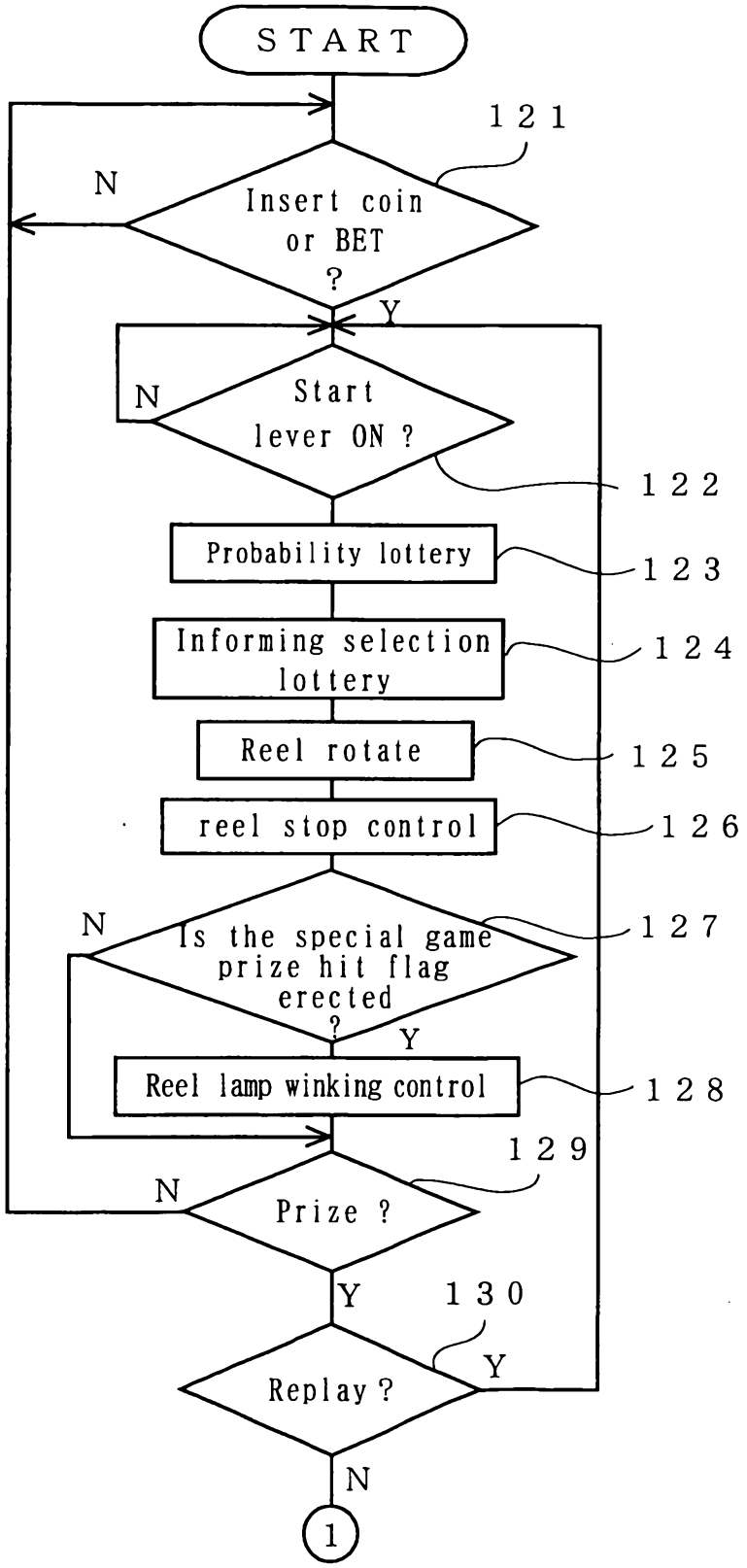
Fig. 15I



Hit flag	BB	RB	Water melon	Bell	4 Cherry	2 Cherry	Replay	Blank
Hit section Data	0~200 (a3=201)	201~380 (b3=381)	381~800 (c3=801)	801~1900 (d3=1901)	1901~4000 (e3=4001)	4001~10000 (f3=10001)	10001~18000 (g3=18001)	18001~65535
Inform section Data	0~150 20000~20200	201~340 20201~20380	381~770 20381~20800	801~1800 20801~21900	1901~3500 21901~24000	4001~9000 24001~30000	10001~17500 30001~38000	38001~65535

Fig. 16

Fig. 17


START
121
Insert coin or BET ?
N
Y
Start lever ON ?
N
122
Probability lottery
123
Informing selection lottery
124
Reel rotate
125
reel stop control
126
Is the special game prize hit flag erected ?
N
127
Y
Reel lamp winking control
128
129
Prize ?
N
Y
130
Replay ?
Y
N
1