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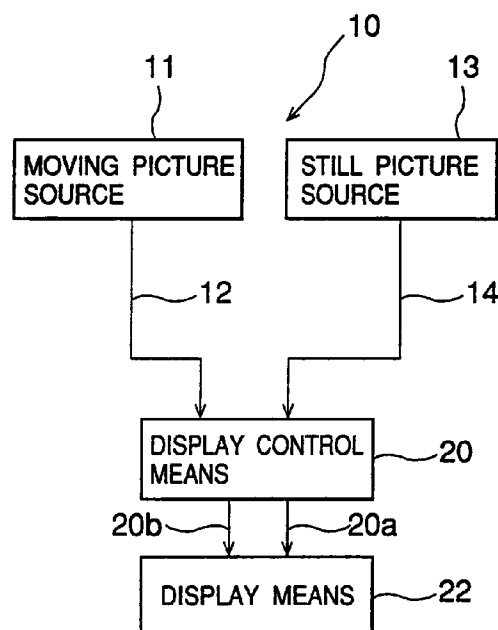
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(54) Gaming machine having a moving picture display function

(57) A gaming machine such as a pinball machine or a slot machine for simulating display of symbols on a plurality of rotation drums on a display 100. The gaming machine displays a moving picture from a moving picture source 11 on the display 100 during a jackpot which is applied if all symbols on the rotation drums match when they rotate and then stop in sequence.

FIG.1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a gaming machine such as a pinball machine or a slot machine and in particular to a gaming machine for simulating rotation drums, normally three rotation drums, disposed in a row on a display.

2. Description of the Related Art

Such a gaming machine will be discussed with reference to Figure 3 by taking a pinball machine of the currently main stream type as an example.

In Figure 3, a display section 100 is provided to carry out simulated display of the operation of rotation drums on subdisplay sections 101 to 103 into which one screen of a flat display device such as a liquid crystal display or a plasma display is divided for convenience.

When a player grasps a propelling dial 107 with his or her right hand and turns it at a desired angle against an elastic force of the propelling dial 107, pinballs stored in a pinball return 110 are propelled intermittently at a rate of several pinballs per second at the strength responsive to the turn angle of the propelling dial 107 by an electric pinball propelling device (not shown). The pinball 122 advances in the direction of an arrow 121 along a guide rail 108 and is discharged in the direction of an arrow 123 at the top end of the guide rail 108 and led to the top of a base board 109.

A large number of obstacle nails 125 (some are shown in the figure) are provided on the base board 109 in addition to the subdisplay sections 101-103, a special win hole 105, and a bumper win hole 106. The pinball can delicately adjust the inclination of the obstacle nails 125 for changing the ease with which pinballs enter the special win hole 105.

Other win holes can be provided in addition to the special win hole 105 and the bumper win hole 106. The term "win" in this specification is used to mean a state in which a pinball 122 enters a win hole, which is a predetermined hole or opening in the base board other than an out hole 111. At the time of win, a predetermined number of pinballs, for example seven pinballs, are paid out to the pinball return 110 from a pinball dispensing mechanism (not shown) normally provided on the rear of the base board 109. When a certain quantity or more of pinballs are stored in the pinball return 110, the excessive pinballs automatically fall into a lower pinball return 112 through an internal passing mechanism (not shown). When the lower pinball return 112 also fills with pinballs, the pinballs are shifted manually to a box provided outside the gaming machine.

Two or more special win holes 105 may be provided. The bumper win hole 106 is formed with a plate-like rectangular lid that can be opened forward of the base board

with the lower side as a hinge shaft. Normally, it is closed; it is opened only under special circumstances, allowing a number of pinballs to enter at a time, as described below.

Particularly, when a pinball enters the special win hole 105, each of the subdisplay sections 101-103 carries out a rotation display of a number of prepared symbols, for example 16 symbols, as symbols rotate on a slot machine, and stops the rotation display of the symbols in sequence under the control of an internal processor for still display of any of the symbols on the front. The term "rotation" or "rotation display" in this specification is used to mean simulation, on a display screen, of a state in which a plurality of symbols represented on the outer peripheral surface of each of three rotation bodies placed in a row rotate in a slot machine for displaying the symbols in a circulating manner.

If a pinball enters the special win hole 105 while the subdisplay sections 101-103 are carried out rotation display, it is guaranteed that after the rotation display stops, rotation is again started up to a predetermined number of pinballs. In other words, the right of rerotation is saved. In the example shown in Figure 3, the predetermined number is four; up to four pinballs entering the special win hole 105 are indicated on four lamps in a number-of-wins display section 104. When some lamps in the number-of-wins display section 104 are on, if rotation display of symbols in all three subdisplay sections 101-103 stops, one lamp goes off. That is, the saving count is decremented by one.

In a case, when the subdisplay sections 101-103 stop rotation display, all three display symbols displayed in the subdisplay match, the bumper win hole 106 opens and allows pinballs to enter the bumper win hole 106. When a predetermined number of pinballs, for example 10 pinballs, enter the bumper win hole 106 or a predetermined time, such as 30 seconds, has elapsed, the bumper win hole 106 is closed. An event in which three symbols displayed in the subdisplay sections 101-103 match is called a "jackpot" and the time interval between the instant at which the bumper win hole 106 first opens and the instant at which it is closed is called a "round."

Generally, most gaming machines of this kind provide a number of successive rounds, for example, 16 rounds for one jackpot. Some models are adapted to allow a player to advance to another round only if a pinball enters a specific part in the bumper win hole 106 in one round.

Generally, in pinball machines of this kind, the subdisplay sections 101-103 stop rotation of symbols in order. Of course, only after two symbols displayed in the subdisplay sections 101 and 102 match, there is a possibility that all three symbols displayed in the subdisplay sections 101-103 will match. Thus, an event in which two symbols displayed in the subdisplay sections 101 and 102 match is called a "possible jackpot."

The most popular method of providing the subdisplay sections 101-103 is by a flat display such as a liquid crystal display or a plasma display.

Pinballs not entering any win holes fall into the out hole and are collected by the pinball hall.

In the pinball hall, a player receives as many pinballs as correspond to the cash which he or she pays at the time of game play start, and can gain a prize according to the number of pinballs that the player has with him or her at the time of game play end. How the player gains a large number of pinballs, namely, causes a large number of pinballs to enter into the special win hole for raising the possibility of a jackpot is the point of playing the game.

By the way, when a jackpot occurs, the subdisplay sections 101-103 blink display of the still symbols corresponding to the jackpot. That is, the jackpot continues for several minutes, during which display in the display section is dull, which is less visually appealing.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a gaming machine for displaying in a new display section so that the visual appeal is raised and the player's excitement is increased when a jackpot occurs.

To this end, according to the invention, there is provided a gaming machine comprising a display device having at least three subdisplay areas into which one display area is divided, the subdisplay areas being arranged in a row, a still picture source for providing a plurality of symbols to be selectively displayed in each of the subdisplay areas, a moving picture source for providing a moving picture to be displayed in the display area made up of the three subdisplay areas, and control means for simulating rotation display of a set of different symbols on the display device upon occurrence of a predetermined event or based on a user instruction, stopping the rotation display of the three subdisplay areas in sequence automatically or by a user instruction, and if all symbols appearing on the front when the rotation display stops match, applying a jackpot to the match, the control means for displaying a moving picture from the moving picture source in the display area in place of the displayed symbols during the jackpot.

According to the invention, there is provided a pinball machine comprising a base board on which a large number of nails for hindering passing of pinballs, at least one special win hole, a bumper win hole which can be opened and closed and is normally closed, and an out hole are placed, a display device having one display area placed on the base board, the display area being divided into at least three subdisplay areas, a mechanism for propelling pinballs to the top of the base board one after another, a moving picture source for providing a moving picture to be displayed in the display area, and control means for simulating rotation display of a predetermined set of different symbols in each of the at least three subdisplay areas based on a pinball entering the special win hole, automatically stopping the rotation display of the three subdisplay areas, and if all symbols appearing on the front when the rotation display stops match, opening

the bumper win hole as a jackpot, the control means for displaying a moving picture from the moving picture source in the display area in place of the displayed symbols during the jackpot.

According to the invention, there is provided a slot machine comprising a display device having one display area placed on a base board, the display area being divided into at least three subdisplay areas, a moving picture source for providing a moving picture to be displayed in the display area, and control means for simulating rotation display of a predetermined set of different symbols in each of the at least three subdisplay areas based on a user instruction, stopping the rotation display of the three subdisplay areas based on a user instruction, and if all symbols appearing on the front when the rotation display stops match, applying a jackpot to the match, the control means for displaying a moving picture from the moving picture source in the display area in place of the displayed symbols during the jackpot.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Figure 1 is a block diagram showing a schematic configuration of a gaming machine according to an embodiment of the invention;

Figure 2 is an illustration showing display examples of a display section in the embodiment; (a) showing a state in which different pictures are displayed on rotation drums, (b) showing a state in which pictures displayed on the rotation drums match, and (c) showing a state in which the display of the display section changes to moving picture display because they match;

Figure 3 is a front view of a pinball machine to which the present invention is applied;

Figure 4 is a block diagram showing the configuration of the embodiment;

Figure 5 is an illustration showing various pieces of data stored in a memory in the embodiment;

Figure 6 is a flowchart showing an operation flow of a special win section control and a number-of-wins display section control in the embodiment;

Figure 7 is a flowchart showing a symbol display process executed by a microprocessor in the embodiment; and

Figure 8 is a flowchart showing a jackpot process, a part of the process in Figure 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the accompanying drawings, there is shown a preferred embodiment of the invention.

In Figure 1, a gaming machine 10 according to the embodiment of the invention has a moving picture source 11 for storing moving picture information displayed when a jackpot occurs, a still picture source 13 for storing still symbols for normal rotation display, display control

means 20 for receiving their outputs 12 and 14, and display means 22 for carrying out rotation display of still pictures or displaying moving pictures under the control of the display control means 20. Still picture data 20a and moving picture data 20b from the display control means 20 are indicated by different signal lines, but may be transmitted on a single signal line, as is shown in Fig. 2.

In the embodiment, nonvolatile recording media, such as CD-ROM, magnetic disk, and nonvolatile semiconductor memory, can be used as the moving picture source 11 and the still picture source 12.

In the embodiment, the display control means 20 is provided by electronic circuitry using a microprocessor. An image processor containing an image compression/enlargement function, etc., may be used together with the microprocessor. Specific processing contents of the display control means 20 will be discussed later.

The display means 22 is a display device such as a liquid crystal display, an EL display, or a CRT, but preferably it is a flat color display device such as a color liquid crystal display.

As with the conventional pinball machine described above, in the embodiment, shown in Fig.3, after a bumper win hole 106 has opened, it is closed when a predetermined number of pinballs, for example 10 pinballs, enter the hole or a predetermined time, such as 30 seconds, elapses. A predetermined number of pinballs, for example, 15 pinballs are paid out to a pinball return 110 for each of the pinballs entering the bumper win hole 106 during the time interval between the instant at which the bumper win hole 106 opens and the instant at which it is closed, namely, in one round. Therefore, once a jackpot occurs, a large quantity of pinballs are output in a short time.

Next, a control section for carrying out the operation of the embodiment will be discussed.

A control section 300 shown in Figure 4, which corresponds to the display control means 20 in Figure 1, is located inside the pinball machine and controls the pinball machine for carrying out the operation of the embodiment described above.

In Figure 4, the control section 300 has a display controller 401, a special win section control 404, a number-of-wins display section control 405, a bumper win section control 406, and a memory 409 under the control of a microprocessor 408. It further includes an I/O control 407 for controlling reading of the moving picture source 11 and a still picture source 12. The display controller 401 controls the display section 100 for carrying out display or rotation display of still picture symbols from the still picture source 12 in the subdisplay sections 101-103 or displaying a moving picture from the moving picture source 11 in the entire display area of the display section 100. The memory 409 is an internal memory for storing a program executed by the microprocessor 408 and various items of data, which will be described with reference to Figure 5, used by the program.

The special win section control 404 receives a signal from a special win section 205 for detecting a pinball

entering a special win hole 105 and informs the microprocessor 408 of the event. That is, whenever the special win section control 404 detects a pinball entering the special win hole 105, it adds 1 to the count of a special win counter provided inside the special win section control 404. The special win counter is a counter that can count from 0 to 3; the count value is output to the number-of-wins display section control 405.

The number-of-wins display section control 405 controls the turning on/off of four lamps provided in the number-of-wins display section 104. That is, it is adapted to display the number of pinballs entering the special win hole 105 (a maximum of four) in the number-of-wins display section 104 based on the count output from the special win section control 404. To do this, the number-of-wins display section control 405 can turn on as many lamps as the count. The bumper win section control 406 controls the bumper win section 206 so as to open or close the bumper win hole 106, under the control of the microprocessor 408. Whenever the bumper win section control 406 detects a pinball entering the bumper win hole 106 while the bumper win hole 106 opens, it informs the microprocessor 408 of the event.

The microprocessor 408 reads the program stored in the memory 409 and executes it for carrying out the operation of the embodiment. The counter function of the control section 404 can also be provided in software by executing the program.

Figure 5 is an illustration showing various items of data stored in the memory 409.

In Figure 5, numerals 501 and 502 are display symbol storage areas for storing the symbols displayed in the subdisplay sections 101 and 102 when rotation display of the subdisplay sections 101 and 102 stops. Numeral 504 is a bumper win counter for counting the number of pinballs entering the bumper win hole 106 up to ten. Numeral 505 is a symbol group storage area for storing a still picture symbol group selected out of the still picture source 12. This symbol group becomes a symbol group placed on the outer peripheral surface of each rotation drum.

Figure 6 is a flowchart showing an operation flow of the special win section control 404 and the number-of-wins display section control 405.

Whenever the special win section control 404 detects a pinball entering the special win hole 105 at step 601, it adds 1 to the count of the special win counter provided inside the special win section control 404 at step 602. The count of the special win counter is output to the number-of-wins display section control 405, which turns on as many lamps provided in the number-of-wins display section 104 as the count at step 603. The operation shown in Figure 6 is always performed independently of the operation of the microprocessor 408 described below. The process can also be executed by program processing of the microprocessor 408. In this case, a special win counter area is provided in a memory and processing is performed concurrently with another processing described below in a time-division manner.

Figures 7 and 8 are flowcharts showing operation flows of the microprocessor 408.

Figure 7 shows a symbol display process in the subdisplay sections 101, 102, and 103 executed by the microprocessor 408. When the pinball machine power is turned on or a propelling dial is turned, the symbol display process is started.

As shown in Figure 7, in the symbol display process, the microprocessor 408 first takes out a still picture group from the still picture source 12 and stores it in the symbol group storage area 505 at step 700. The symbol group may be predetermined. It can also be selected, for example, at random from among symbols stored in the still picture source 12 each time the process is started. Figure 2 shows a state in which pictures of human figures are adopted as a symbol group and different human figures are displayed on the rotation drums 101-103. However, pictures or symbols are not limited to human figures and may be anything.

Next, the microprocessor 408 determines the count of the special win counter in the special win section control 404, and if the count is not 0 at step 701, it outputs an operation start signal to the display controller 401 for starting the operation of the subdisplay sections (rotation drums) 101-103 at step 702 and subtracts one from the count of the special win counter at step 703, whereby the display controller 401 starts the operation of the subdisplay sections 101-103.

Subsequently, when a predetermined time or the time found by random number calculation has elapsed, the microprocessor 408 outputs an operation stop signal to the display controller 401 for stopping the operation of the subdisplay section 101 at step 704. The display controller 401 then stops rotation display of the subdisplay section 101 and outputs the symbol displayed when the rotation display of the subdisplay section 101 stops to the microprocessor 408, which then stores the display symbol output from the display controller 401 in the display symbol storage area 501 of the memory 409 at step 705.

Likewise, when a predetermined time or the time found by random number calculation has elapsed, the microprocessor 408 outputs an operation stop signal to the display controller 401 for stopping rotation display of the subdisplay section 102 at step 706 and stores the display symbol output from the display controller 401 in the display symbol storage area 502 of the memory 409 at step 707.

Subsequently, when a predetermined time or the time found by random number calculation has elapsed, the microprocessor 408 outputs an operation stop signal to the display controller 401 for stopping the operation of the subdisplay section 103 at step 708. When rotation display of the subdisplay section 103 stops, the microprocessor 408 compares the symbol displayed at the time with other two symbols previously stored in the areas 501 and 502 at step 709. If they do not match, the microprocessor 408 deletes the display symbols stored

in the display symbol storage areas 501 and 502 at step 710 and returns to step 701.

On the other hand, if the three display symbols match at step 709, the microprocessor 408 performs a jackpot process (shown in Figure 8) at step 711. After the jackpot process ends, the microprocessor 408 goes to step 710. Figure 2 (b) shows a state in which all human figure pictures displayed on the rotation drums (three subdisplay areas) which stop match.

As shown in Figure 8, in the jackpot process, the microprocessor 408 first changes the display of the display section 100 to display of a moving picture from the moving picture source 11 at step 801, whereby the moving picture is displayed in the entire area of the display section 100 as shown in Figure 2 (c). In the embodiment, a different moving picture can be displayed for each round. The fact that the current round is round 1 is indicated on the background of the moving picture shown in the figure.

Next, the microprocessor 408 outputs an open signal to the bumper win section control 406 for opening the bumper win hole 106 at step 802, whereby the bumper win section control 406 opens the bumper win hole 106, allowing pinballs to enter the bumper win hole 106. Each time the bumper win section control 406 detects a pinball entering the bumper win hole 106 while the bumper win hole 106 is open, it outputs a win detection signal indicating the event to the microprocessor 408, as described above.

When the win detection signal is output from the bumper win section control 406 at step 804 by the time a predetermined time, such as 30 seconds, has elapsed at step 803 after jackpot rounds were entered, the microprocessor 408 adds one to the count of the bumper win counter 504 at step 805.

If the count of the bumper win counter 504 does not reach 10 at step 806 as a result of adding one to the count of the bumper win counter 504, the microprocessor 408 returns to step 803. If the count reaches 10, the microprocessor 408 goes to step 807. When the predetermined time (in this case, 30 seconds) has elapsed at step 803 regardless of the count of the bumper win counter 504, the microprocessor 408 also goes to step 807.

At step 807, the microprocessor 408 outputs a closing signal to the bumper win section control 406 for closing the bumper win hole 106, whereby the bumper win section control 406 closes the bumper win hole 106, disabling pinballs from entering the bumper win hole 106. At the same time, the microprocessor 408 resets the value of the bumper win counter 504.

If the microprocessor 408 determines that all rounds end at step 808, it restores the display of the display section 100 to still picture display at step 809 and ends the process. If not all rounds end, the microprocessor 408 returns to step 801, performs moving picture display in the next round, and repeats the process until all rounds end.

The pinball machine of the embodiment can also be adopted to allow another round only if a pinball enters a specific part of the bumper win hole 106 in one round.

A pinball dispensing mechanism is provided to dispense pinballs in response to pinballs entering the special win hole 105 or the bumper win hole 106. A win detection signal indicating that a pinball has entered the special win hole 105 is output to the pinball dispensing mechanism from the special win section control 404 and a win detection signal indicating that a pinball has entered the bumper win hole 106 is output to the pinball dispensing mechanism from the bumper win section control 406. When the win detection signal is output from the special win section control 404, the pinball dispensing mechanism dispenses, for example, seven pinballs to a pinball return 110. When the win detection signal is output from the bumper win section control 406, the pinball dispensing mechanism dispenses, for example, 15 pinballs to the pinball return 110. The pinball dispensing mechanism can be provided as follows: For example, a supply passage where pinballs are arranged in a row for supplying pinballs to each pinball machine from the pinball hall is normally shut off and when the control signal is output from the microprocessor 408, the supply passage is opened for supplying as many pinballs as specified.

To produce sound effects, a sound effect output mechanism is provided (not shown) for outputting normal sound effects, possible jackpot sound, and jackpot sound effects. A win detection signal is output from the special win section control 404 to the sound effect output mechanism and a win detection signal is output from the bumper win section control 406 to the sound effect output mechanism. Preferably, voice data is contained in the moving picture source 11. When a moving picture is displayed, a voice corresponding to the moving picture is output.

In the description, the display section 100 displays three symbols on only one horizontal line. However, three symbols can be displayed on each of two or more horizontal lines and a match among the three symbols on each line can be detected. When a match on any line is detected, a jackpot can also be applied. To adopt three horizontal lines, a symbol match on a diagonal line of 3 x 3 symbols can also be detected.

In the description, a moving picture is displayed only when a jackpot occurs. However, a moving picture may also be displayed while the effective number of wins in the special win section 205 is 0, and when the effective number of wins becomes one or more, the display may be changed to rotation display of a still picture.

Although we have discussed pinball machines, the invention can also be applied to other gaming machines such as slot machines if they use a display device for simulating symbol display on rotation drums.

Claims

1. A gaming machine comprising:
 - a display device having at least three subdisplay areas into which one display area is divided, the subdisplay areas being arranged in a row;
 - a still picture source for providing a plurality of symbols to be selectively displayed in each of the subdisplay areas;
 - a moving picture source for providing a moving picture to be displayed in the display area made up of the three subdisplay areas; and
 - control means for simulating rotation display of a set of different symbols on said display device upon occurrence of a predetermined event or based on a user instruction, stopping the rotation display of the three subdisplay areas in sequence automatically or by a user instruction, and if all symbols appearing on the front when the rotation display stops match, applying a jackpot to the match,
 - said control means for displaying a moving picture from said moving picture source in the display area in place of the displayed symbols during the jackpot.
2. A pinball machine comprising:
 - a base board on which are placed a large number of nails for hindering passing of pinballs, at least one special win hole, a bumper win hole which can be opened and closed and is normally closed, and an out hole;
 - a display device having one display area placed on said base board, the display area being divided into at least three subdisplay areas;
 - a mechanism for propelling pinballs to the top of the base board one after another;
 - a moving picture source for providing a moving picture to be displayed in the display area; and
 - control means for simulating rotation display of a predetermined set of different symbols in each of the at least three subdisplay areas based on a pinball entering the special win hole, automatically stopping the rotation display of the three subdisplay areas, and if all symbols appearing on the front when the rotation display stops match, opening the bumper win hole as a jackpot,
 - said control means for displaying a moving picture from said moving picture source in the display area in place of the displayed symbols during the jackpot.
3. The pinball machine as claimed in claim 2 further including a still picture source containing a plurality of still picture symbols and means for selecting a plurality of symbols to be displayed in each of the subdisplay areas out of said still picture source.
4. The pinball machine as claimed in claim 3 wherein said plurality of symbols are selected at random.

5. A gaming machine for simulating rotation display of a set of different symbols in at least three subdisplay areas into which one display area is divided, the subdisplay areas being arranged in a row, upon occurrence of a predetermined event or based on a user instruction, then stopping the rotation display of the three subdisplay areas in sequence automatically or by a user instruction, and if all symbols appearing on the front when the rotation display stops match, applying a jackpot to the match, wherein a moving picture from a provided moving picture source is displayed in the display area made up of the three subdisplay areas in place of the displayed symbols during the jackpot.
6. A slot machine comprising:
- a display device having one display area placed on a base board, the display area being divided into at least three subdisplay areas;
 - a moving picture source for providing a moving picture to be displayed in the display area; and
 - control means for simulating rotation display of a predetermined set of different symbols in each of the at least three subdisplay areas based on a user instruction, stopping the rotation display of the three subdisplay areas based on a user instruction, and if all symbols appearing on the front when the rotation display stops match, applying a jackpot to the match,
- said control means displaying a moving picture from said moving picture source in the display area in place of the displayed symbols during the jackpot.
7. The slot machine as claimed in claim 6 further including a still picture source containing a plurality of still picture symbols, wherein a plurality of symbols to be displayed in each of the subdisplay areas are selected out of said still picture source.
8. The slot machine as claimed in claim 7 wherein said plurality of symbols are selected at random.

FIG.1

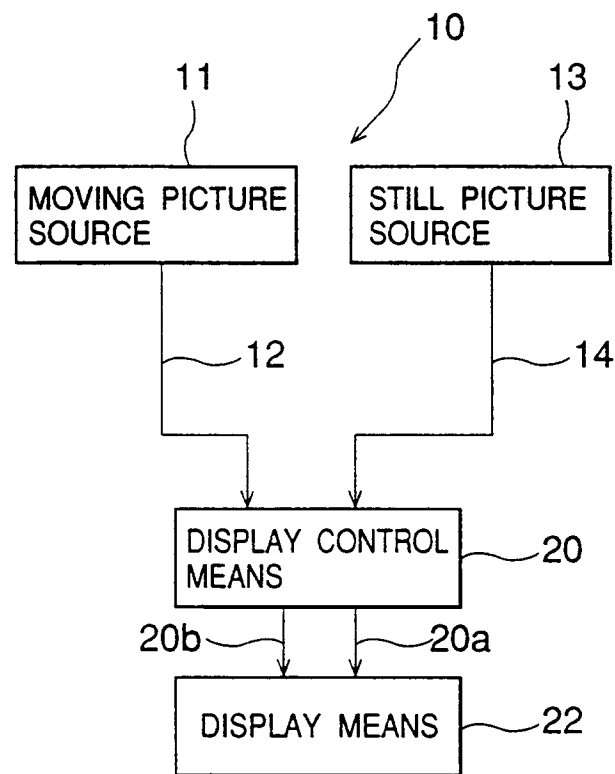


FIG.2

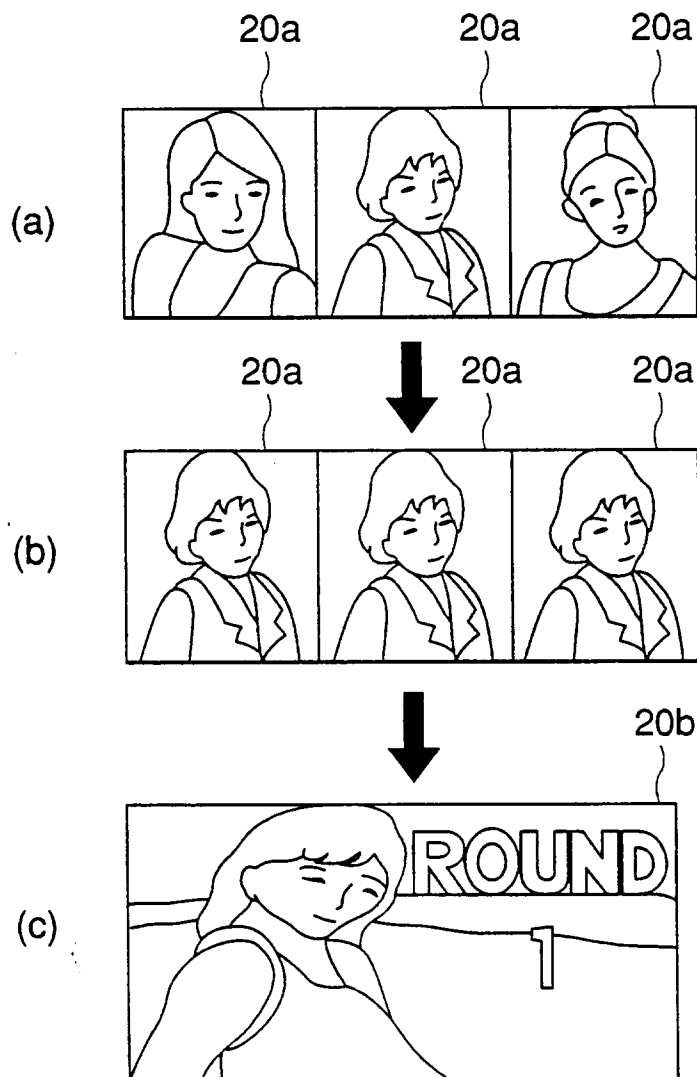


FIG.3

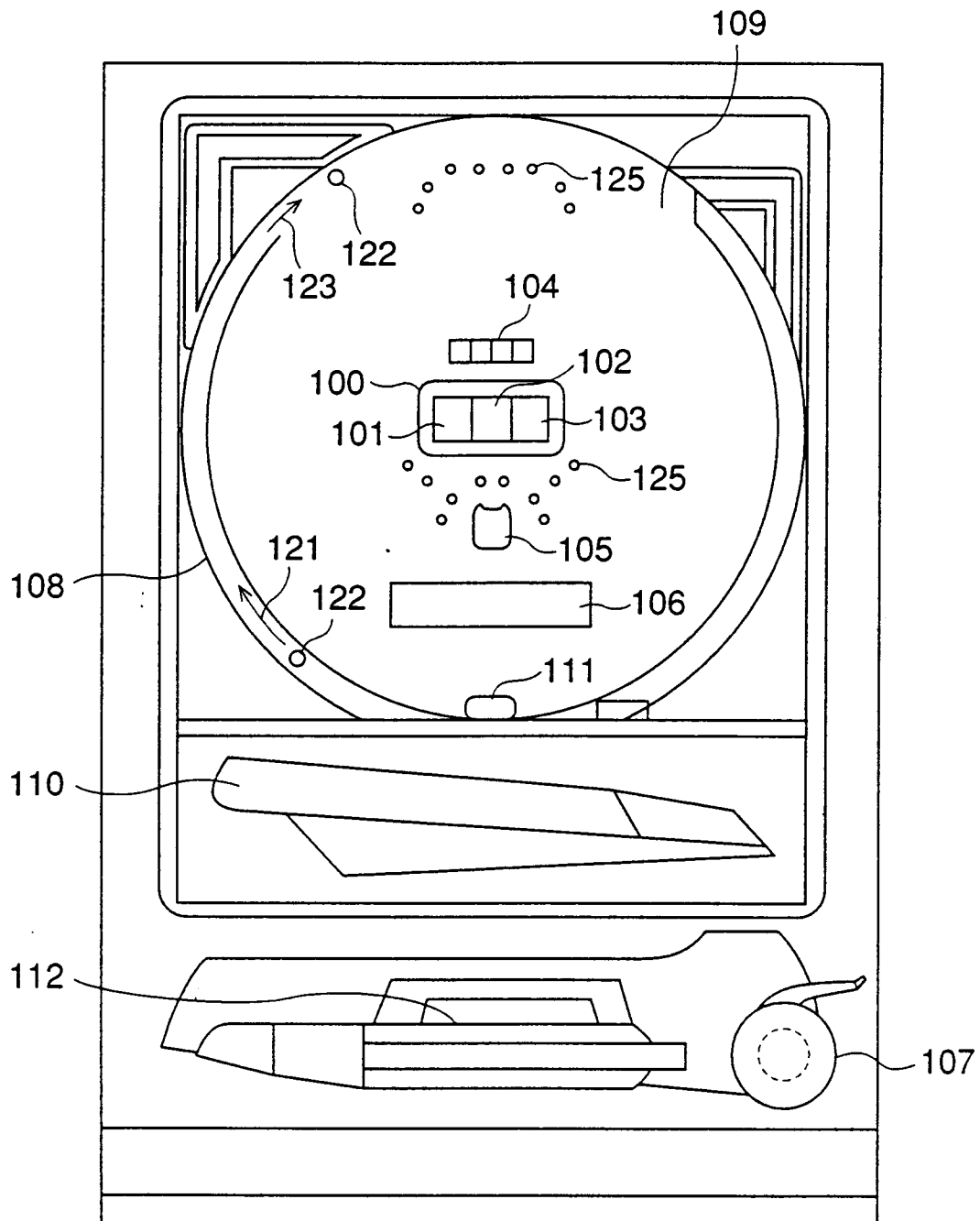


FIG.4

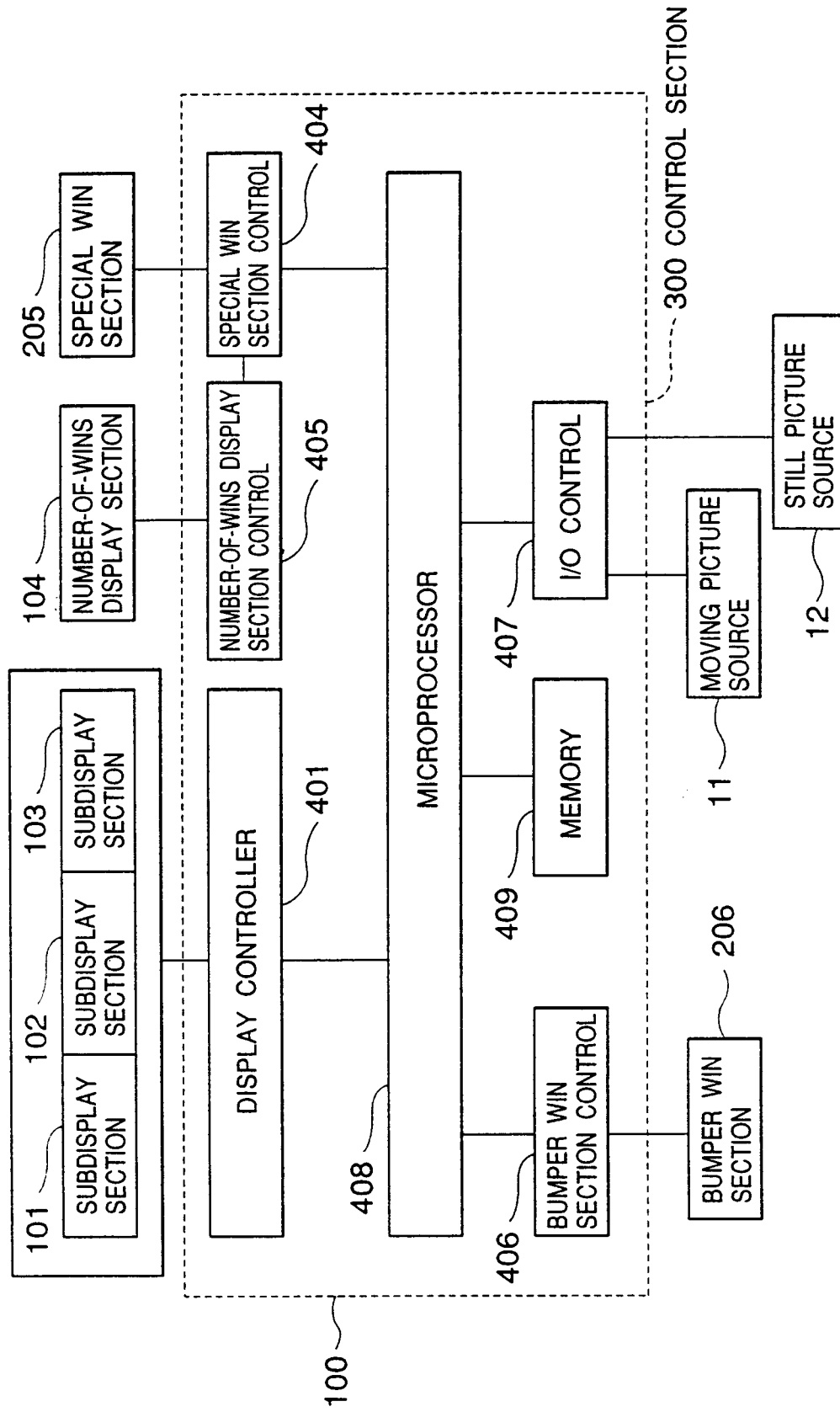


FIG.5

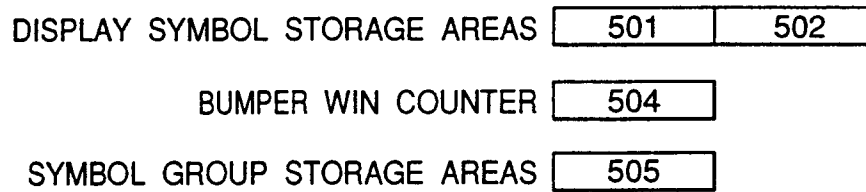


FIG.6

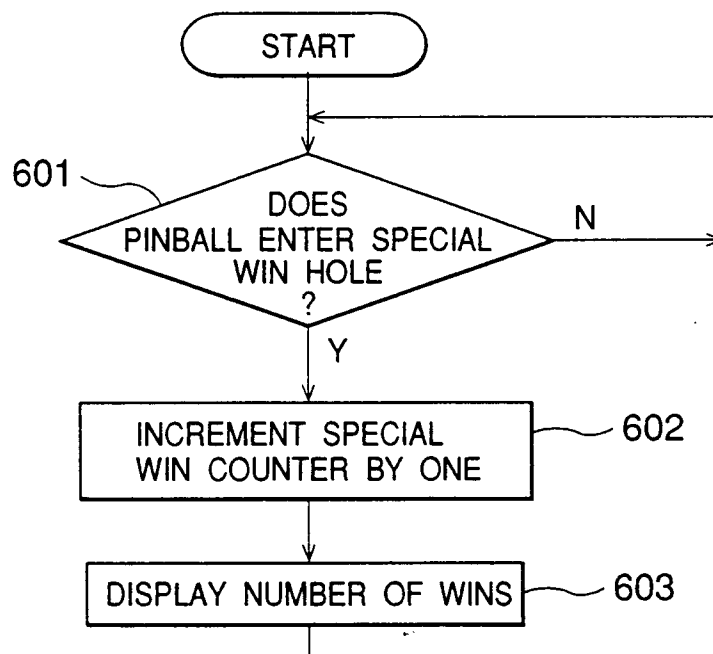


FIG.7

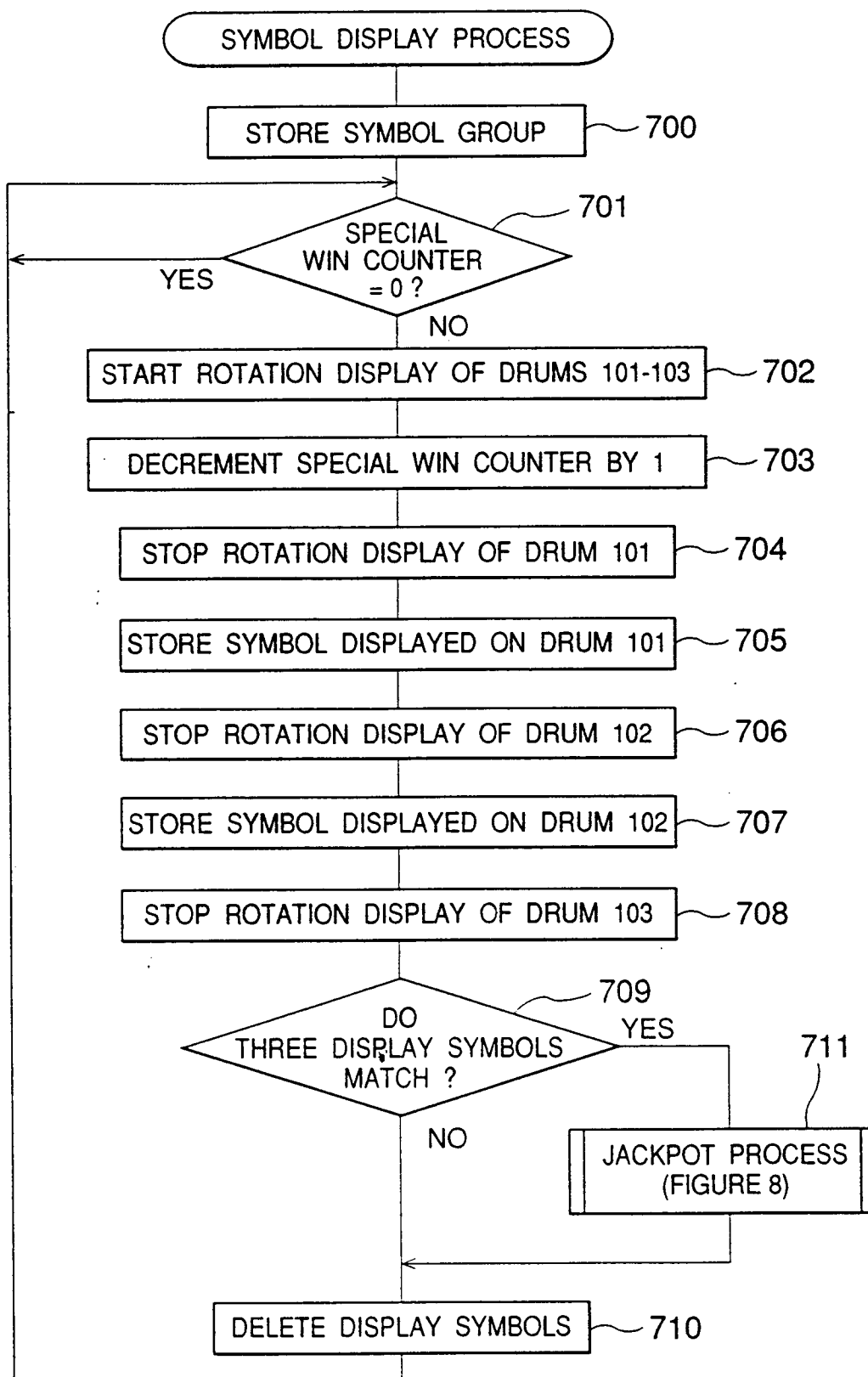
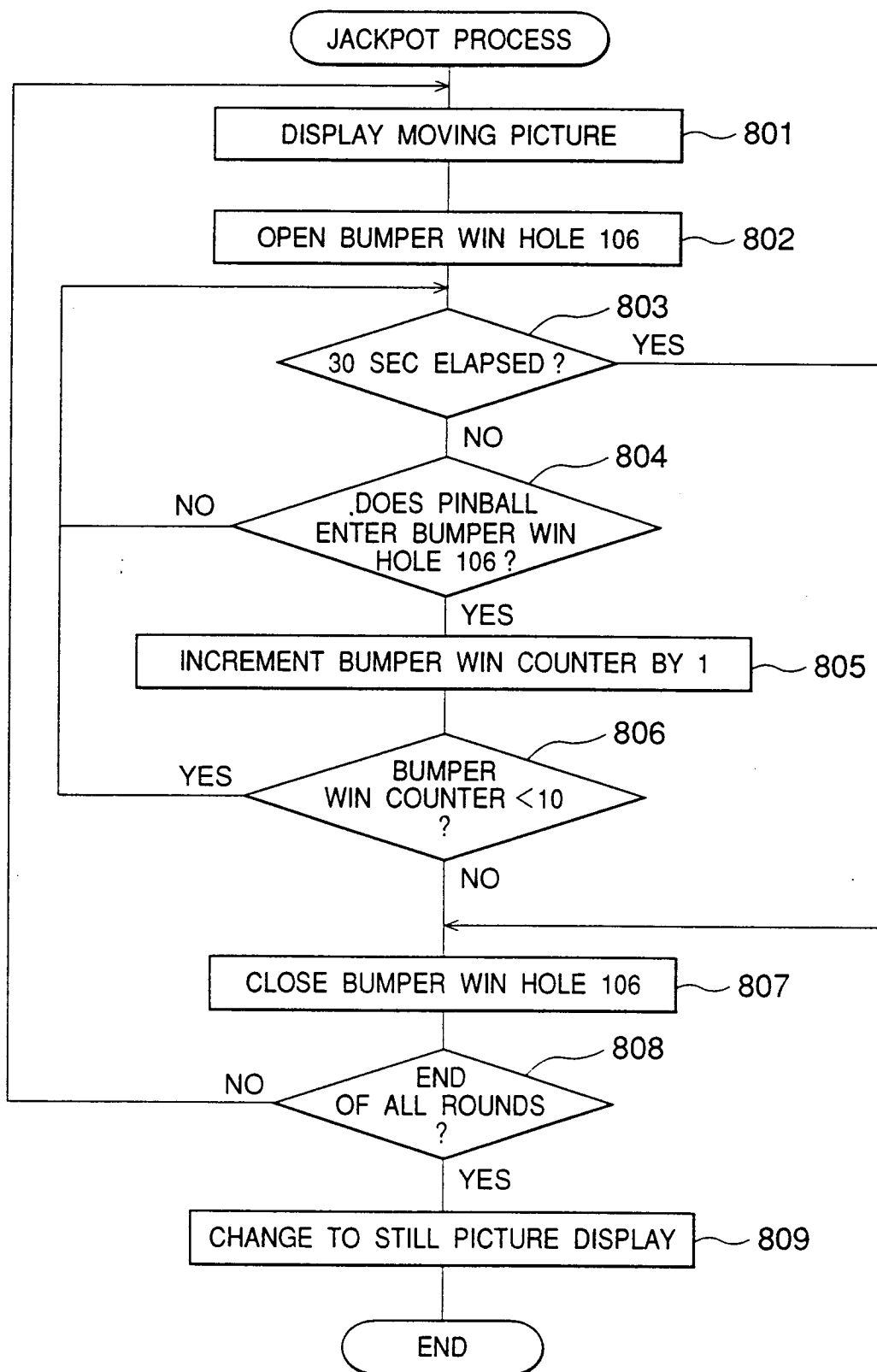


FIG.8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 0567

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.6)
A	GB-A-1 466 765 (BELL-FRUIT MANUFACTURING) * page 2, line 76 - page 3, line 84 * -----	1-8	G07F17/32
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G07F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 December 1995	Examiner Neville, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			