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(54) GAME MACHINE

(57) A ball (22) is hit by a stick (23) at one end of a mat (11) to hit any one of a plurality of rotating bars (15) provided on the other end of the mat. Therefore, the rotating bar, which the ball has hit, is rotated. This rotation is detected by a detecting means which comprises a permanent magnet and a Hall element, and the detected result is fed to a display device (25) through a length of cable (24). An operation processing unit in the display device (25) counts the number of rotations for each hit ball to generate a table representative of what rotating bar is hit by which ball, and an image signal indicative of the number of rotations to display them on a television receiver. Various games can be performed with the rotating bars and the number of rotations as parameters by changing a software.

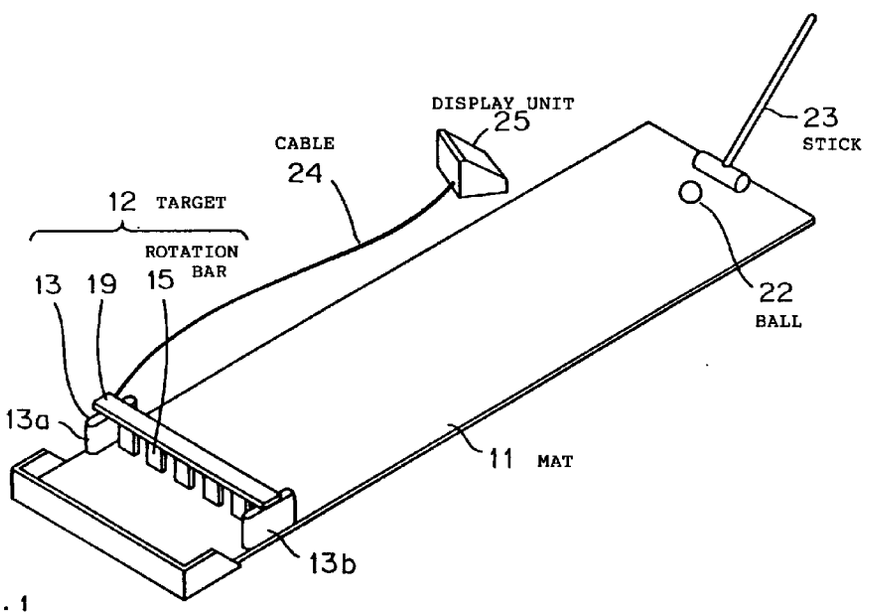

FIG. 1

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Description

TECHNICAL FIELD

The present invention relates to a game apparatus for enjoying a game by rolling a ball with a stick to rotate a rotation bar.

BACKGROUND ART

A utility model application No. Hei 5-677613 "A physical strength measuring apparatus for a rehabilitation" filed on December 20, 1993 has been proposed by the inventor of the present invention. As shown in Fig. 1, in this apparatus, a mat 11 is laid on the floor and a target 12 is positioned at one end of the mat 11. As shown in Fig. 2, in the target 12, props 13a and 13b are positioned on the both side edges of the mat 11, an axis 14 is horizontally arranged between the props 13a and 13b and a plurality of rotation bars 15 are rotatably mounted on the axis 14 such that the centroid of the rotation bar 15 is below the axis 14. In this example, the rotation bar is a rectangular plate shape and the rotation bar is pierced by the axis 14 through the width direction and rotatably held by the axis 14. A tube shaped spacer 17 is provided co-axially on the axis 14 for each rotation bar 15 so that the rotation bar 15 does not move along the direction of the axis 14. Rotation detecting means 16 is provided to generate a rotation signal for each rotation i.e., to detect each rotation when the rotation bar rotates. In this example, a permanent magnet 18 is mounted on one end farther from the axis 14 for each of the rotation bars 15 and a coupling rod 19 is fixed between the upper ends of the props 13a and 13b. A magnetic sensor element 21 such as a Hall element or a reed switch is mounted at each portion on the coupling rod 19 to which each rotation bar 15 faces. When a rotation bar 15 rotates, a rotation detecting signal is outputted from the magnetic sensor element 21 facing to the rotation bar 15 for each rotation of the rotation bar 15. The target 12 comprises these rotation bars 15 and the rotation detecting means 16.

A ball 22 is placed on the other end portion of the mat 11 and the ball 22 is hit with a stick 23 toward the target 12. The ball rolls toward the target 12 and reaches thereto. A rotation bar is rotated by the ball 22. When the rotation bar is rotated, a rotation detecting signal is outputted each time the permanent magnet passes near the magnetic sensor element 21 facing to that rotation bar 15. The rotation detecting signals from those magnetic sensor elements are supplied to the respective wires in a cord 24 whose one end is fixed on one prop 13b via the wires positioned along the coupling rod 19. The cord 24 is connected to a display unit 25 located outside close to the mat 11 to display an indication of the rotated rotation bar and the number of rotations.

S pole and N pole of permanent magnets may be mounted on the upper end and the lower end of each rotation bar respectively to increase the sensitivity when a Hall element is used as a magnetic sensor element 21.

The ball 22 is a spherical body whose diameter is approximately 45 mm consisting of a plastic material and the stick 23 is made of a wooden or a plastic material. The stick is T shaped hammer type and the ball is hit by a end surface or a side surface of the top part of T shape. A mat is placed on a space of width 50 cm and length 3 m. The ball 22 is hit with the stick 23 and the ball rolls toward the rotation bar 15 and strikes the rotation bar 15. The more number of rotations indicates that the ball 22 is hit stronger. Thus, the physical strength of the hitter can be known from the number of rotations. A plurality of persons can compete the score such as the number of rotations of the rotation bar 15 for a single hitting or the total number of rotations of the rotation bar 15 for a predetermined number of hitting times. Therefore, the apparatus can be used as a game apparatus.

However, the apparatus shown in Fig. 1 is not suitable for enjoying a game because the display unit 25 is too simple as a game apparatus. Only a simple game can be played using the apparatus shown in Fig. 1.

It is an object of the present invention to provide a game apparatus for displaying an intermediate progress of a game using the target, the ball and the stick.

It is another object of the present invention to provide a game apparatus by which a complex game can be enjoyed using the target, the ball and the stick.

DISCLOSURE OF THE INVENTION

According to the present invention, in a game apparatus wherein a target on which a plurality of rotation bars are rotatably mounted on a horizontal axis is provided, and a ball is hit with a stick to roll the ball, to strike the rotation bar and to rotate the rotation bar, and a rotation detecting signal for each rotation is detected by rotation detecting means, each rotation detecting signal is inputted to a computation processing part from the rotation detecting means, and the computation processing part calculates the score based on the rotated rotation bar or the number of rotations of the rotation bar or the both as the parameter and outputs the result including the intermediate progress as an image signal until a game completes, the image signal being supplied to a display unit, and the game progress and the game result are displayed as an image.

When the number of rotations is used as the parameter, the computation processing part counts the number of detected rotation signals for each ball hitting to obtain the number of rotations of the rotation bar and to identify the maximum value of the number of rotations as a score during the time from game start to that time. In this case, the counting of the number of rotations is performed only when one of the predetermined rotation bars is rotated and the rotation bar for which the number of rotations is counted is displayed by an image signal in the sequence of the ball hitting.

When the rotation bar is used as the parameter, the computation processing part accumulates a weight value preassigned to the rotation bar for every input of

the detected rotation signal based on a ball hitting and displays the accumulated value as the score. Also, the computation processing part displays in image which rotation bar is rotated.

When the rotation bar and the number of rotations are used as the parameters, the computation processing part counts the detected rotation signals to obtain the number of rotations for every input of the detected rotation signals by one ball hitting. Then the computation processing part gives the hitter the number of unit regions in a region preassigned to the rotation bar based on the number of rotations so that the hitter acquires the total value of the number of unit regions given to the hitter in each region for each rotation bar as the score. As the result, each region for each rotation bar, the acquired number of unit regions in each region, the total value of the acquired unit regions and the number corresponding to the number of hitting times are displayed in image.

In either case mentioned above, the highest value in the past is obtained to display in image. Also, the previous score is displayed in image as required basis. Means for inputting a foul signal is provided to input a foul when a ball does not strike any one of the rotation bars or when a rotation bar does not rotate at all. When a foul signal is inputted, the computation processing part advances the game progress by one step and the step advance due to the foul play is displayed in image responsive to the step advancement based on the foul play.

In the other case where a rotation bar and the number of rotations are used as the parameters, the computation processing part counts the rotation detecting signals by one ball hitting to obtain the number of rotations and gives the number of regions in a region preassigned to the rotation bar to each of two hitters (a hitter A in the odd order and a hitter B in the even order). When no remaining unit region exists, a hitter acquires the unit regions which the other hitter has already acquired. As the result, each region for each rotation bar, a region acquired by the hitter of the odd order and a region acquired by the hitter in the even order are displayed in image. Further, when a hitter acquires all the unit regions in a region, the other hitter is prohibited to acquire any unit region in the region. When rotation detecting signals of a rotation bar corresponding to the prohibited region are inputted, if the signals are based on the hitter who has acquired all the unit regions in the region, the acquired unit regions are released by the number corresponding to the number of rotations. When all the regions are in the prohibited state, the hitter of the two who has acquired more regions than the other is the winner and the game ends. Each region is linear line shaped and arranged in parallel each other. Each unit region is formed by diving each region in equal interval along the longer side direction. The unit region acquisition by the odd order hitter starts from one end of each region and the unit region acquisition by the even order hitter starts from the other end of each region. Total value of the number of acquired unit regions by the odd order hitter and total value of the number of acquired unit regions by the even order hitter may be obtained to display each of the total values in image as a score.

In the other case where the rotation bar and the number of rotations are the parameters, the rotation detecting signals are counted for every rotation detecting signal input by one ball hitting to obtain the number of rotations and a mark is moved unit length corresponding to the number of rotations to the direction predetermined to the rotation bar. As the result, the moving path of the mark, the goal and the number of ball hitting times are displayed in image.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an oblique diagram showing an external shape of a previously proposed game apparatus;

Fig. 2 is a diagram showing a front view of each specific example of a target 12 and rotation detecting means 16 in Fig. 1;

Fig. 3 is a block diagram showing a computation processing part 31 which is a main part of the game apparatus of the present invention and its peripheral portions;

Fig. 4 is a flow chart showing a process flow of the main program of the computation processing part 31;

Fig. 5 is a diagram showing an example of the image display of the main menu;

Fig. 6 is a diagram showing an example of the initial image display in the rotation game;

Fig. 7 is a flow chart showing a flow of a process example of the game execution program of the rotation game;

Fig. 8 is a diagram showing an example of an intermediate image display in the rotation game;

Fig. 9 is a flow chart showing a flow of a process example of the game execution program of the score game;

Fig. 10 is a diagram showing an example of an intermediate image display in the score game;

Fig. 11 is a diagram showing an image display example at the time of game end in the region acquisition 1 game;

Fig. 12 is a flow chart showing a process example of the game execution program of the region acquisition 1 game;

Fig. 13 is a diagram showing an example of an intermediate image display of the region acquisition 2 game;

Fig. 14 is a flow chart showing a process example of the game execution program of the region acquisition 2 game; and

Fig. 15 is a diagram showing an example of an image display of the goal game where each rotation bar is correlated to a direction and the number of rotations is a parameter.

BEST MODE FOR IMPLEMENTING THE INVENTION

As shown in Fig. 1, in the present invention, a target 12 is positioned at one end of a mat 11. A ball 22 is hit with a stick 23 and rolled toward the target 12 to rotate a rotation bar 15 of the target 12. Rotation detecting means 16 is provided for each rotation bar 15.

As shown in Fig. 3, in the present invention, rotation detecting signals from the rotation detecting means 16 of each rotation bar are inputted to a computation processing part 31. The computation processing part 31 is constructed by connecting a computation processing unit (CPU) 33, a ROM 34, a RAM 35, an interface 36 to the rotation detecting means 16, game ROMs 37_1-37_n where game programs are stored, a character generator 38, an interface 41 to a mouse 39, an interface 43 to a keyboard 42 having various switches and an interface 45 to a video RAM 44 to a bus 32. A display device 47 is connected to the video RAM 44 and an image signal stored in the video RAM 44 is displayed on the display device 47. For example, a carrier wave is modulated by the image signal stored in the video RAM 44 in a TV signal generation part 48 and supplied to a television set 49 as an open channel signal of the television system.

A basic program in the ROM 34 is read out and executed by the CPU 33. Namely, when the power supply of this game apparatus is turned on as shown in Fig. 4, the game names available in this game apparatus are displayed on a screen 51 of the display device 47 (main menu display: S_1) and a game name selection by moving a marker 52 by the mouse 39 is prompted (S_2). When a game name is selected, the selected game program stored in the corresponding one of the game ROMs 37_1-37_n is read out and executed. In the execution of the game program, a fixed image signal is generated first and transferred to the video RAM 44 for displaying on the display device 47 (S_3). For example, when the rotation game is selected, as shown in Fig. 6 for example, the rotation bar images 15_{B1}', 15_{Y1}', 15_R', 15_{Y2}' and 15_{B2}' indicating the rotation bar 15 are displayed on the upper portion of the screen in the left to right arrangement. Numerals "1" through "10" indicating the hitting times of the ball 22 with the stick 23 are displayed as the image 53 just below the rotation bar images in the left to right arrangement. Images 54_{Y1}, 54_R and 54_{Y2} indicating the rotation bars 15_{Y1}, 15_R and 15_{Y2} respectively are displayed on the left side of the screen below the image 53 in up-down arrangement. Incidentally, in this example, the five rotation bars 15 in Fig, 1 are colored in blue, yellow, red, yellow and blue respectively from left to right. When a specific rotation bar of the rotation bars 15 is talked about, each rotation bar is indicated as 15_{B1}, 15_{Y1}, 15_R, 15_{Y2} and 15_{B2} from left to right. The images 54_{Y1}, 54_R and 54_{Y2} represent the characters "YELLOW", "RED" and "YELLOW" respectively. Instead of these characters, a yellow rectangle image, a red rectangle image and a yellow rectangle image respectively may be displayed.

Character images "HIGHEST" 55, "PREVIOUS" 56 and "NUMBER OF ROTATIONS" 57 are displayed below the image 54_{Y2} in the arrangement left to right. Rectangle frame images 58, 59 and 61 are displayed below the character images 55, 56 and 57 respectively. In addition, character images "TERMINATION" 62, "FOUL" 63 and "MAIN MENU" 64 contained in the respective rectangle frames are displayed below the rectangle frame images 58, 59 and 61 in the left to right arrangement. The character generator 38 is used for this fixed image signal generation as necessary basis. The cursor 52 is always positioned close to ,e.g. immediately below, the character image "FOUL" 63.

After displaying such a fixed image, the computation processing part 31 executes the game execution program which executes the selected game (S_4). For example, when a rotation game is selected as in the above example, the process shown in Fig. 7 is performed. First, an initialization process is performed (S_5) to set the highest number of rotations after the power on of the game apparatus or after the game apparatus is first used, namely the highest number of rotations R_M in the past. When R_M is set as the highest number of rotations after the power on, R_M is initialized to R_M=0. When R_M is set as the highest number of rotations after the game apparatus is first used, the highest number of rotations R_M stored in, for example, a electrically programmable ROM is stored in the predetermined area of, for example, the RAM 35 as R_M=R_M. Also, the highest number of rotations in the previous game R_{mp} is set to zero, the highest number of rotations up to that point in time in the current game R_m is set to zero and the number of hitting times is set to zero and then those initialized values are stored in the respective predetermined areas of the RAM 35.

An input of a rotation detecting signal is awaited in this state (S_6). When a person who uses the game apparatus (referred to as a player) hits a ball 22 with a stick 23 to roll the ball, the ball strikes one of the rotation bars, the rotation bar rotates and the rotation detecting signals are inputted, the rotation detecting signals are counted to count the number of rotations R_i of the rotation bar by one ball rolling (S_7). This number of rotations R_i is checked to see if R_i is greater than the current highest number of rotations R_m (S_8). If R_i is greater than R_m, the number of rotations R_i is stored as the highest number of rotations up to that point in time (S_9). If R_i is not greater than R_m, the number of rolling times (ball hitting times) is incremented by 1 (S_{10}). A check is made to see if i matches a predetermined number of rolling times, for example 10 (S_{11}). If i does not match the predetermined number, the process moves to step S_{12} to update the display contents of the display screen. Namely, the current R_M, R_{mp} and R_m are displayed in the frame images 58, 59 and 61 respectively. Also, the rotated rotation bar can be identified based on the detecting element 21 which the rotation detecting signals come from and a double circle image 65, for example, is displayed at the location corresponding to the rotated rotation bar and the number of hitting times (round number) i, and then the

process returns to step S_6. Fig. 8 shows a display screen 51 at the time when fifth hitting round is finished. In this example, the number of rotations is counted only when either one of the central rotation bar 15_R and the adjacent rotation bars 15_{Y1} and 15_{Y2} is rotated. The number of rotations of the other rotation bars 15_{B1} and 15_{B2} is ignored. Therefore, when the rotation detecting signals are inputted between steps S_6 and step S_7, a check is made to see if the rotation detecting signals are from either one of the valid rotation bars 15_R, 15_{Y1} and 15_{Y2}. If these are from the valid rotation bars, the process moves to step S_7 but if these are from the other rotation bars 15_{B1} and 15_{B2}, the process moves to step S_{10}.

In Fig. 8, it is displayed that the rotation bar 15_R is rotated in the first hitting round (the number of hitting times i=1), the rotation bar 15_{Y1} is rotated in the second hitting round and the rotation bars 15_R and 15_{Y2} are rotated at the same time in the fifth hitting round (i=5). There is no image display 65 for sixth round and after and thus it could be understood that the screen indicates the state that fifth round is finished. In addition, the screen indicates that, for example, the highest number of rotations R_M after the power on is 15, the highest number of rotations R_{mp} in 10 hitting rounds of the previous game is 12 and the highest number of rotations R_m up to that point in time (i=5) in the current game is 10. When two rotation bars 15_R and 15_{Y2} are rotated at the same time as in fifth round (i=5), the sum of the number of rotations of both rotation bars is counted as the number of rotations in fifth round. An X image 66 is displayed for fourth round. The X image indicates that when a ball 22 is hit with a stick 23, the ball 22 does not strike any of the rotation bars or the ball 22 strikes the invalid bar 15_{B1} or 15_{B2}. In this case, when the player clicks the "FOUL" image 63 with the cursor 52, namely when the player makes an input operation after moving the cursor 52 on the "FOUL" image 63, the computation processing part 31 identifies the interruption of the foul, the process moves to step S_{10} from step S_6 in Fig. 7. When the ball strikes the rotation bar 15_{B1} or 15_{B2}, the process moves to step S_{10} from step S_6 without clicking with the cursor. In addition, in this example, when rotation detecting signals are inputted, a rotation bar image corresponding to the rotated rotation bar, for example, 15_{Y2}' is rotated. The rotation of the rotation bar image is performed, for example, by taking the picture of rotating image of each rotation bar with a video camera, by storing each video image in a memory, by reading out the video image from the memory and by writing the video image in the corresponding portion of the video RAM.

When i=10 in step S_{11}, after a properly determined short period of time (S_{12}), a check is made to see if the highest value R_m of current game is greater than the highest value R_M in the past (S_{14}). If R_m is greater than R_M, the R_m is stored as the new R_M (S_{15}). If R_m is not greater than R_M, the process moves to step S_{16}. In step S_{16}, the number of hitting times i is set to zero, the highest number R_m in the current game is set in the highest number R_{mp} of the previous game and then the highest number R_m in the current game is set to zero. And then in step S_{17}, the display is updated and the process returns to step S_6. At this time, on the screen 51 in Fig. 8, all the double circle images 65 and all the X images are erased. In addition, if the value in the frame image 58 is changed in step S_{15}, the updated value is displayed therein, and if not changed, the previous value is displayed. Also, the value R_m is displayed in the frame image 59 and zero value is displayed in the frame image 61. In this state, the next game is started by hitting a ball 22 with a stick 23. Incidentally, the number of rotations by the current ball hitting may be displayed in the rectangle frame image 61.

As mentioned above, in the present invention, a single player can enjoy how many rotations of the rotation bar are achieved by one ball hitting or a plurality of players can compete the number of rotations of the rotation bar. Since an intermediate state of a game is displayed on the screen 51, players can enjoy the game more than in the conventional game apparatus.

In Fig. 8, when the character image "TERMINATION" 62 is clicked by the cursor 52, the screen 51 returns to the initial state i.e., the state shown in Fig. 6. When the character image "MAIN MANU" 64 is clicked by the cursor 52, the screen 51 is changed to the state where the main menu shown in Fig. 5 is displayed.

Next, an embodiment of a game (game name: score game) in which the rotation bar is the parameter will be explained. In this example, when the ball 22 strikes the rotation bar 15_R, seven points are given, when the ball 22 strikes the rotation bar 15_{Y1} or 15_{Y2}, three points are given and when the ball 22 strikes the rotation bar 15_{B1} or 15_{B2}, one point is given. In this case, players compete (enjoy) the total point value acquired in a game. As shown in Fig. 9 for example, in the process flow of the game execution program, an initialization is performed to set the number of hitting times (round number) i to zero, the highest score S_M in the past to zero or to the value S_M read out from the programmable ROM, the previous score S_p to zero and the current score S_i to zero (S_{18}). An input of the rotation detecting signals is awaited in this state (S_6). When the rotation detecting signals are inputted, the points S (weight) given to the rotated rotation bar which has caused the input of the rotation detecting signals is added to the current score S_i to obtain the new current score S_i (S_{19}). For example, if the rotation detecting signals caused by the rotation of the rotation bar 15_R are inputted, S=7 is added to S_i and if the rotation detecting signals caused by the rotation of the rotation bar 15_{Y1} are inputted, S=3 is added to S_i. Then, the display is updated (S_{20}). Namely, the display of the screen 51 in this case is, for example, shown in Fig. 10, and the same reference symbols are assigned to the portions corresponding to those in Fig. 8. In this case, numeral images "7" 67_1, "3" 67_2 and "1" 67_3 contained in the respective frames are displayed instead of the character images 54_{Y1}, 54_R and 54_{Y2} and a character image "SCORE" 68 is displayed instead of the character image "NUMBER OF ROTATIONS" 57.

Red, yellow and blue rectangle images may also be displayed instead of the respective numeral images 67_1, 67_2 and 67_3. In this example, character images "ROTATION" 69, "REGION ACQUISITION 1" 71 and "REGION ACQUISITION 2" 72 are displayed on the bottom line of the screen instead of the character image "MAIN MENU" 64.

In this example where the acquired score in each ball hitting time (round number) image 53 corresponds to the rotated rotation bar at that time, double circle images 65 are displayed at the positions corresponding to the round number and point images 67_1, 67_2 and 67_3. In this case, the highest score S_M in the past is displayed in the rectangle frame image 58, the score S_p in the previous game is displayed in the rectangle frame image 59 and the current score S_i in the current game is displayed in the rectangle frame image 61. In the example of Fig. 10, the state where sixth (i=6) ball rolling is finished is shown. In this case, it is displayed that the ball 22 has struck the rotation bar 16_R and the rotation bar 16_{Y1} or 16_{Y2}. This score S=10 is added to the current score S_5=25 in the current game to obtain the new score S_6=35 and the new current score S_6=35 in the current game is displayed in the frame image 61. The highest score S_M in the past and the score S_p in the previous game are also displayed in 58 and 59 respectively.

After the display update in step S_{20}, the number of ball hitting times i is incremented by one (S_{10}). Then, a check is made to see if i is a predetermined number 10 (S_{11}). If i is not 10, the process returns to step S_6 to await next input of the rotation detecting signals. In this game, if the ball 22 does not strike any one of the rotation bars, the character image "FOUL" 63 is clicked by the cursor 52 as in the previous example. When an interruption by the FOUL click occurs, the process moves from step S_6 to step S_{20}. If the number of ball hitting times i is 10 in step S_{11}, the process waits for the passage of the predetermined short time period (S_{13}). Then a check is made to see if the score S_i in the current game i.e., S_{10} in this example, is greater than the highest score S_M in the past (S_{22}). If S_i is greater than S_M, the S_i is set in S_M (S_{23}). If S_i is not greater than S_M, the process moves to step S_{24}. Then, the score S_i in the current game is set in the score S_p in the previous game, and both current score S_i in the current game and the round number i are set to zero (S_{24}). Then the process returns to step S_6 (S_{25}) after the associated display updates. Namely, the double circle images 65 and the X images (not shown in Fig. 10) are erased and a zero value is set in the rectangle frame image 61. This state is the display state which is automatically displayed by the fixed image generation program of this game program when this score game is selected. Incidentally, in Fig. 10, the aforementioned character image "MAIN MENU" 64 is not displayed. However, as shown in Fig. 5, the number of games selectable in the main menu in this embodiment is four. The game names other than currently selected game are already displayed as the character images 69, 71 and 72. Therefore, when the currently selected game is finished, the cursor 52 is moved onto the character image of the desired game name if any of the other games are desired. When a click is made on the game name, the fixed image of the game is displayed on the display screen 51. In this way, the game switching can be made with less operations than the case where the screen is returned to the main menu and a game name is selected.

Next, an embodiment of a region acquisition game 1 (game name: REGION ACQUISITION 1) in which a rotation bar and its number of rotations are the parameters and a single player can play will be explained. Fig. 11 shows a display example of the screen 51 in this case. In this example, character images "HIGHEST" 55, "PREVIOUS" 56, "SCORE" 68 and "REMAINING ROUNDS" 74 are displayed in the arrangement from left to right on the uppermost portion of the screen 51. At the immediate below portions of these character images, the respective rectangle frame images 58, 59, 61 and 75 are displayed. Regions 76_{B1}, 76_{Y1}, 76_R, 76_{Y2} and 76_{B2} of the same size (the same length in this example) corresponding to the rotation bars 15_{B1}, 15_{Y1}, 15_R, 15_{Y2} and 15_{B2} respectively are displayed in the up-down arrangement below those rectangle frame images. Those regions extend from left to right in long and narrow shape and are equally divided along the extending direction to form unit regions 77. Each one end of the regions 76_{B1}-76_{B2} is aligned and blue, yellow, red, yellow and blue rectangle images 54_{B1}, 54_{Y1}, 54_R, 54_{Y2} and 54_{B2} corresponding to the respective rotation bars are positioned at the ends of the regions respectively and a vertically extended line 78 indicating the player's side is displayed adjacent to the other ends of the regions. In this game, the unit regions are acquired in each region corresponding to the rotated bar in accordance with the number of rotations caused by the ball rolling and the acquisition is indicated from the end (line 78's side) of each region. The number of all the acquired unit regions 77 in predetermined number of ball hitting is the score of the player.

Fig. 12 shows an example of the process flow of this game execution program. In the initialization step S_{27}, the number of rounds i is set to zero, the highest score A_M in the past is set to zero (or to a value A_M read out from the programmable ROM), the score A_q up to the previous round, the score R_i in the current round, the numbers of acquired unit regions A_{B1}, A_{Y1}, A_R, A_{Y2} and A_{B2} in the respective regions 76_{B1}, 76_{Y1}, 76_R, 76_{Y2} and 76_{B2}, and the total score G up to the current round from the game start are all set to zero and the total number of rounds j to the game end is set to, for example, 5. After these initializations, an input of the rotation detecting signals is awaited (S_6). When the rotation detecting signals are inputted, the rotation detecting signals are counted to obtain the number of rotations R of the rotation bar by one hitting (round) (S_7). A check is made to see if the acquisition of unit regions 77 in the region 76_q (q: one of B1, Y1, R, Y2 and B2) corresponding to the rotated rotation bar 15_q is first time. If first time, the player acquires the unit regions 77 in the region 76_q by the number rotations R (S_{29}). Namely, the acquisition of the unit regions

77 in the region 76_q is A_q. For example, if the rotation bar 15_R rotates R=7 rotations, the acquisition A_R of the unit regions 77 in the region 76_R is A_R=7.

On the other hand, if the acquisition of the unit regions 77 in the region 76_q is not first time and some unit regions have been already acquired therein, the number of rotations R is added to the number of acquired unit regions A_q in the region 76_q to obtain a new A_q (S_{30}). Then a check is made to see if the new A_q is greater than the number of unit regions 77 forming the region 76_q (10 in this example) (S_{31}). If the A_q is greater than 10, the excess number (e.g. 3 if A_q is 13) is subtracted from the maximum number of unit regions 10 to make the remainder a new acquired number A_q (S_{32}). Namely, if the number of acquired unit regions exceeds the maximum value, the number of acquisition is reduced by the excess number. The new A_q is subtracted from the old A_q to obtain R (S_{33}).

If A_q is not greater than 10 in step S_{31}, and also after steps S_{29} and S_{33}, R is added to the score G to obtain a new score G (S_{34}). Then after i is incremented by one (S_{10}), the display is updated. For example, this display is shown in Fig. 11. That is, in addition to the explanation above, the acquired unit regions 77 in each region are indicated by an acquisition line 81 extending along the longer direction of the region 76_q. This acquisition line 81 is formed on a linear line in the region 76_q. Eight unit regions are acquired in the region 76_{B1} and 10 unit regions, i.e., the entire region, are acquired in the region 76_{Y1}. This acquisition, i.e., the acquisition line 81 is drawn from the line 78 of player's side. All the unit regions are acquired in the region 76_{Y1} and the acquisition line 81 is formed through the entire length of the region 76_{Y1}. It is shown that no unit region is acquired in the region 76_{Y2}.

The number of ball hitting times in one game is 5 for example, and the remaining number of ball hitting times j=5-i to the end of the game is displayed in the rectangle frame image 75. In Fig. 11, "0" is displayed to indicate that one game has been finished. The total of the number of acquired unit regions 77 in the respective regions A_{B1}, A_{Y1}, A_R, A_{Y2} and A_{B2} from the game start is displayed in the rectangle frame image 61 positioned below the character image "SCORE" as the score G. In this example, the score G=35 is displayed. The highest score G_M=50 in the past and the score G_p=45 in the previous game are displayed in the rectangle frame images 58 and 59 respectively.

After such a display update is performed in step S_{35}, a check is made to see if the number of ball hitting i is the predetermined number 5 (S_{11}). If i is not 5, the process returns to step S_6. If i is 5, the process awaits the passage of a predetermined short time period (S_{13}) and then a check is made to see if the current score G is greater than the highest score G_M in the past (S_{22}). If the current score G is greater than G_M, the highest score G_M in the past is updated (S_{23}). Then, the current score G is set in the previous score G_P and then the number of acquired unit regions A_q in each region and the number of rounds i are all set to zero (S_{36}). Then, the display update corresponding to this process is performed to return to step S_6 (S_{37}). Incidentally, when all the unit regions 77 in a region have been acquired, its acquisition line 81 or the rectangle color image 54_q may be blinked. When the ball 22 strikes the rotation bar corresponding to the blinking region and the rotation bar rotates R rotations, the acquired number of unit regions in that region is reduced by the number of rotations R. This process is performed in steps S_{28}-S_{33} and blinking is stopped. When the ball 22 does not strike any one of the rotation bars upon the ball hitting, the character image "FOUL" 63 is clicked by the cursor 52 to interrupt into step S_{10}.

Next, an example of a game (game name: REGION ACQUISITION 2) in which a rotation bar and its number of rotations are the parameters and two players can play will be explained. The display example of the screen 51 in this case is shown in Fig. 13 and the same reference symbols are assigned to the portions corresponding to those of Fig. 11. In this example, players A and B alternately hit the ball and each player acquires the unit regions 77 in the regions 76_{B1}, 76_{Y1}, 76_R, 76_{Y2} and 76_{B2} from a predetermined side, for example, from left end for the player A and from right end for the player B. The unit regions acquired by the players A and B are indicated by the acquisition lines 81_A and 81_B respectively. The winner is a player who acquires all the regions first or a player whose acquired regions are more than the other in the predetermined number of ball hitting times. In this case , some conditions could be given, for example, when all the unit regions 77 in a region are acquired by a player, the acquisition in that region is inhibited, and when the player who has acquired all the unit regions in the region strikes and rotates the rotation bar corresponding to the inhibited region, the number of acquired regions is reduced by the number of rotations and the inhibition is canceled, etc.. In Fig. 13, the number of unit regions in each region is 17.

Fig. 14 shows an example of the process flow of the process program of this game. In the initialization step S_{41}, the number of acquired unit regions A_{B1}, A_{Y1}, A_R, A_{Y2} and A_{B2} of the player A and the number of acquired unit regions B_{B1}, B_{Y1}, B_R, B_{Y2} and B_{B2} of the player B are all set to zero. The score G_A of the player A and the score G_B of the player B are also set to zero. And then, a flag F for indicating which player is playing is set to A to indicate that the player A (for example, zero) is playing. At the beginning of the game, the first player is decided by, for example, JANKEN (a kind of mora, toss-up). If the player B is the first player, the cursor 52 is moved onto the line 78 and clicked to move the line 78 to the right end of the region 76_q and to move the rectangle color image 54_q to the left end of the region 76_q. That is, after the initialization, a judgement is made to see if the first player is the player A based on the presence or absence of a click on the line 78 (S_{42}). If the click is made and thus the first player is judged to be the player B, the line 78 is swapped with the rectangle color image 54_q on the screen and the flag F is set to B (one in the above exam-

ple) (S_{43}). Then the process enters the state awaiting the rotation detecting signals (S_6). If the first player is the player A, the rotation detecting signals are inputted without clicking the line 78. When the rotation detecting signals are inputted, the signals are counted to obtain the number of rotations R (S_7). When all the unit regions in the region corresponding to the rotation bar by which the rotation detection signals are generated are acquired, a check is made to see if one player has acquired all the unit regions in the region (S_{44}). When all the unit regions in the region are not acquired, the number of rotations R is added to the current player's number of acquired unit regions C_q (C_q represents A_q when the flag is A or B_q when the flag is B) (S_{45}). A check is made to see if the number of rotations R is greater than the number $A_S=17-(A_q+B_q)$, which is the number of unit regions not yet acquired by either of the player A or the player B in the region 76_q (S_{46}). If R is greater than A_S, the acquisition D_q of the other player (B_q if F is A or A_q if F is B) is reduced by the excess number ($R-A_S$) (S_{47}).

When it is judged that all the unit regions in the region have been acquired by one player, a further check is made to see if the player who has acquired all the unit regions in the region 76_q is the player who hit the ball this time. Namely, for example, when the flag F is A (or B), a check is made to see if the acquired number A_q (or B_q) in the region 76_q is A_q (or B_q)=17 (S_{48}). If it is judged that the player is the same player, the number of rotations R is subtracted from A_q (=17) of the region 76_q, i.e., R unit regions out of previous acquired number are released (S_{49}). When R is not greater than A_q in step S_{46}, and after steps S_{47} and S_{49}, the display is updated to display updated display lines 81A and 81B in accordance with the changes of the acquired numbers A_q and B_q. After this display update, the process waits for a passage of predetermined short time period (S_{13}). Then a check is made to see if the game is finished (S_{51}). That is, a check is made to see if each of the regions 76_q has been acquired by either one of the players.

If the game is not finished, the flag F is switched and the swapping of the line 78 and the rectangle color images 54_q is performed (S_{52}). Then, the process returns to step S_6 and receives the rotation detecting signals caused by the ball hitting of the alternate player. When the game is finished, the player who has acquired more regions is defined as a winner. The number of wins G_C (G_A if the flag F is A or G_B if the flag F is B) of the player is incremented by 1 and then, the display of the corresponding number of wins is updated and the swapping of the line 78 and the rectangle color image 54_q is performed. Then, the process moves to step S_6 (S_{53}). Incidentally, if it is judged that the player is not the same player in step S_{48}, the process moves to step S_{13}. When the ball 22 does not strike any one of the rotation bars, the character image "FOUL" is clicked by the cursor 52 to cause an interruption so that the process moves from step S_6 to step S_{51}. In this case, on the screen 51, a rectangle frame image 83A is displayed at the upper left position, a rectangle frame image 83B is displayed at the upper right position and a character image "NUMBER OF WINS" 84 is displayed at the upper central position. The number of wins G_A of the player A and the number of wins G_B of the player B are displayed in the rectangle frame images 83A and 83B respectively.

In the above example, end of the game is defined as the state where each of the regions has been acquired by either of the players. However, end of the game may also be defined as the state where one player has acquired more than half number of regions first (in this example, three regions) and the player becomes the winner. Alternatively, each player alternately hits the ball 10 times. For each ball hitting, R is added to the score of the current player in step S_{45}, ($R-A_s$) is subtracted from the other player's score in step S_{47}, and R is subtracted from the current player's score in step S_{49}. After the predetermined number of ball hitting times, the player whose score is greater than the other, of the player A's score and the player B's score, is the winner. In this case, the scores of both players are displayed including inter mediate progresses of those scores.

In the region acquisition games shown in Figs. 11 and 13, the acquired regions could be indicated in rectangle or other shape instead of line shape. Also, the acquired regions could be indicated not only by an acquisition line but also by, for example, painting the acquired unit regions in a predetermined color. Further, the area, i.e., the number of unit regions of each region could be different region by region rather than the same number for all the regions.

Next, a further different game whose parameters are the rotation bar and the number of rotations will be explained. A display example of the screen 51 in this case is shown in Fig. 15. On the screen 51, a mark moving area 91, a mark starting point 92, a goal 93, a mark 94 and gates 95 provided at appropriate positions in the moving area 91 are displayed. The mark 94 is positioned at the starting point 92 in the initial state. The rotation bars 15_{B1}, 15_{Y1}, 15_R, 15_{Y2} and 15_{B2} correspond to down direction, left direction, upper direction, right direction and down direction respectively. When a rotation bar is rotated by a ball hitting, the mark 94 moves within the area 91 the length corresponding to the number of rotations of the rotation bar in the direction corresponding to the rotation bar. For example, the mark 94 is moved about 5 mm by one rotation of the rotation bar. For example, if the rotated rotation is 15_R and the number of rotations is 3, the mark 94 is moved 5*3 mm in upper direction. In such a way, the rotation bars are rotated by the ball hitting so that, in this example, the mark 94 reaches the goal 93 via the two gates 95. The number of ball hitting times by which the mark 94 moves from the starting point 92 to the gaol 93 is displayed in a rectangle frame image 96. During the game, the intermediate number of ball hitting times is displayed in the rectangle frame image 96. The least number of ball hitting times in the past and the number of ball hitting times in the previous game are displayed in frame images 58 and 59 respectively. The path 97 on which the mark 94 has

moved from the starting point 92 is also displayed. When the mark 94 moves and reaches the boundary of the moving area 91, the mark returns the remaining moving length to the opposite direction.

In the above description, a game selection, a foul interruption etc. are performed by the cursor movement and the clicking by a mouse, like a foul is inputted by a cursor clicking. However, a keyboard 42 may also be used to perform the game selection, the foul interruption etc. by the operation of the keyboard 42 by providing various key switches on the keyboard 42. Each program of various games may also be provided in a cassette to use a program by changing the cassette as required basis.

The game progress can also be printed if necessary.

As mentioned above, according to the present invention, since the intermediate progress of the game is generated by the computation processing part and displayed on a display device during the game, the game is more enjoyable. In addition, a simple game and a game requiring high skills can be played by selecting the games, and thus people of various generations from children to old people can enjoy this game apparatus. Since a usual television receiver can be used as the display device, the required facilities are a ball, a stick, a target and a computation processing part. Thus, the apparatus can be constructed in low cost and can be played if a flat space of approximately 50 cm width and 3 m length is available.

Claims

1. A game apparatus comprising:
   a target having a common horizontal axis on which a plurality of rotation bars are rotatably mounted;
   a ball for rolling to strike said rotation bars and to rotate said rotation bars;
   a stick for hitting and rolling said ball toward said target;
   rotation detecting means for generating a rotation detecting signal for every one rotation of each said rotation bar;
   a computation processing part for receiving each rotation detecting signal from said rotation detecting means to obtain a score based on the rotated rotation bar or the number of rotations of the rotation bar or the both as the parameters and for outputting the result including the intermediate progress as image signals until a game is finished; and
   display means for displaying the image signals of the intermediate progress and the result from said computation processing part.

2. The game apparatus according to claim 1 wherein said computation processing part comprises:
   means for counting the received rotation detecting signals to obtain the number of rotations of the rotation bar caused by each ball hitting; and
   means for obtaining the highest value of said number of rotations from the start of one game as a score.

3. The game apparatus according to claim 2, further including means for counting said number of rotations only when a predetermined rotation bar is rotated and for displaying by said image signals which rotation bar's rotations are counted, in the order of the ball hitting.

4. The game apparatus according to claim 1 wherein said computation processing part comprises:
   means for accumulating a weight value pre-assigned to the rotation bar for every input of the rotation detecting signals caused by one ball hitting; and
   means for displaying the accumulated value as a score.

5. The game apparatus according to claim 4 wherein said computation processing part includes means for displaying by said image signals which rotation bar is rotated in the order of ball hitting.

6. The apparatus according to claim 1 wherein said computation processing part comprises:
   means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input caused by a ball hitting and for causing a ball hitter to acquire unit regions by the number of rotations in a region pre-assigned to the rotation bar;
   means for obtaining the total number of unit regions acquired in each region of each rotation bar; and
   means for displaying by said image signals the region of each rotation bar, the acquired unit regions in each region and the number corresponding to the number of ball hitting times.

7. The game apparatus according to any one of claims 2 to 6 wherein said computation processing part includes:
   means for obtaining the highest value of the past score; and
   means for displaying said highest value by said image signals.

8. The game apparatus according to claim 7 wherein said computation processing part includes means for displaying the previous score by said image signals.

9. The game apparatus according to any one of claims 1 to 6, further including:
   means for inputting as a foul that said ball does not strike any one of said rotation bars upon the ball hitting;

means for causing said computation processing part to advance the game progress by one step upon the input of said foul; and

means for displaying said step advance by said image signals in accordance with the game progress based on said foul.

10. The game apparatus according to claim 6 wherein said computation processing part includes means for releasing the acquired unit regions by the excess number when the acquisition of the unit regions in said region exceeds the region.

11. The game apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input caused by a ball hitting and for causing a ball hitter in odd order and a ball hitter in even order to acquire unit regions separately by the number of rotations in a region pre-assigned to the rotation bar;

means for causing the ball hitter to acquire the unit regions which the other hitter has already acquired, at said acquisition time when no remaining unit region exists in the region; and

means for displaying by said image signals each region for each of said rotation bars, the acquired unit regions of each odd order and the acquired unit regions of each even order.

12. The game apparatus according to claim 11 wherein said computation processing part includes means for inhibiting the other player to acquire the unit regions in the region when one player has acquired all the unit regions in the region.

13. The game apparatus according to claim 12 wherein said computation processing part includes means for releasing the acquired unit regions by the number of rotations when the rotation detecting signals of the rotation bar corresponding to said inhibited region are detected and the signals are based on the ball hitting by the player who has acquired all the unit regions in the inhibited region.

14. The game apparatus according to claim 12 or 13 wherein said computation processing part includes means for detecting that all said regions are in the inhibited state of the acquisition, and for ending the game defining the player as the winner who has acquired more regions, of the acquired regions of the odd order player and the acquired regions of the even order player.

15. The game apparatus according to claim 14 wherein each said region is linear line shaped and is arranged in parallel each other, and each said region is equally divided along its longer direction to form unit regions, and said acquisition means is means for acquiring the unit regions from one end of each region for odd order acquisition and for acquiring from the other end of each region for even order acquisition.

16. The game apparatus according to any one of claims 11 to 13 wherein said computation processing part includes:

means for obtaining a total value of the number of acquired unit regions in said odd order and a total value of the number of acquired unit regions in said even order; and

means for displaying each total value as a score by said image signals.

17. The game apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input and for moving a mark unit length to the direction pre-assigned to the rotation bar by the number of rotations; and

means for displaying by said image signals the moving path of said mark, the goal and said number of hitting times.

Amended claims

1. (ONCE AMENDED) A game apparatus comprising:

a target having a common horizontal axis on which a plurality of rotation bars are rotatably mounted;

a ball for rolling to strike said rotation bars and to rotate said rotation bars;

a stick for hitting and rolling said ball toward said target;

rotation detecting means for generating a rotation detecting signal for every one rotation of each said rotation bar;

a computation processing part for receiving each rotation detecting signal from said rotation detecting means to obtain a score based on both of the rotated rotation bar and the number of rotations of the rotation bar as the parameters and for outputting the result including the intermediate progress as image signals until a game is finished; and

display means for displaying the image signals of the intermediate progress and the result from said computation processing part.

2. The game apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the received rotation detecting signals to obtain the number of rotations of the rotation bar caused by each ball hitting; and

means for obtaining the highest value of said number of rotations from the start of one game as a score.

3. The game apparatus according to claim 2, further including means for counting said number of rotations only when a predetermined rotation bar is rotated and for displaying by said image signals which rotation bar's rotations are counted, in the order of the ball hitting.

4. (DELETED)

5. (DELETED)

6. The apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input caused by a ball hitting and for causing a ball hitter to acquire unit regions by the number of rotations in a region pre-assigned to the rotation bar;

means for obtaining the total number of unit regions acquired in each region of each rotation bar; and

means for displaying by said image signals the region of each rotation bar, the acquired unit regions in each region and the number corresponding to the number of ball hitting times.

7. The game apparatus according to any one of claims 2 to 6 wherein said computation processing part includes:

means for obtaining the highest value of the past score; and

means for displaying said highest value by said image signals.

8. The game apparatus according to claim 7 wherein said computation processing part includes means for displaying the previous score by said image signals.

9. The game apparatus according to any one of claims 1 to 6 further including:

means for inputting as a foul that said ball does not strike any one of said rotation bars upon the ball hitting;

means for causing said computation processing part to advance the game progress by one step upon the input of said foul; and

means for displaying said step advance by said image signals in accordance with the game progress based on said foul.

10. The game apparatus according to claim 6 wherein said computation processing part includes means for releasing the acquired unit regions by the excess number when the acquisition of the unit regions in said region exceeds the region.

11. The game apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input caused by a ball hitting and for causing a ball hitter in odd order and a ball hitter in even order to acquire unit regions separately by the number of rotations in a region pre-assigned to the rotation bar;

means for causing the ball hitter to acquire the unit regions which the other hitter has already acquired, at said acquisition time when no remaining unit region exists in the region; and

means for displaying by said image signals each region for each of said rotation bars, the acquired unit regions of each odd order and the acquired unit regions of each even order.

12. The game apparatus according to claim 11 wherein said computation processing part includes means for inhibiting the other player to acquire the unit regions in the region when one player has acquired all the unit regions in the region.

13. The game apparatus according to claim 12 wherein said computation processing part includes means for releasing the acquired unit regions by the number of rotations when the rotation detecting signals of the rotation bar corresponding to said inhibited region are detected and the signals are based on the ball hitting by the player who has acquired all the unit regions in the inhibited region.

14. The game apparatus according to claim 12 or 13 wherein said computation processing part includes means for detecting that all said regions are in the inhibited state of the acquisition, and for ending the game defining the player as the winner who has acquired more regions, of the acquired regions of the odd order player and the acquired regions of the even order player.

15. The game apparatus according to claim 14 wherein each said region is linear line shaped and is arranged in parallel each other, and each said region is equally divided along its longer direction to form unit regions, and said acquisition means is means for acquiring the unit regions from one end of each region for odd order acquisition and for acquiring from the other end of each region for even order acquisition.

16. The game apparatus according to any one of claims 11 to 13 wherein said computation processing part includes:

means for obtaining a total value of the number of acquired unit regions in said odd order and a total value of the number of acquired unit regions in said even order; and

means for displaying each total value as a score by said image signals.

17. The game apparatus according to claim 1 wherein said computation processing part comprises:

means for counting the rotation detecting signals to obtain the number of rotations for every rotation detecting signal input and for moving a mark unit length to the direction pre-assigned to the rotation bar by the number of rotations: and

means for displaying by said image signals the moving path of said mark, the goal and said number of hitting times.

Brief statement of amendment under article 19(1)

In claim 1, it has been made clear that the score is obtained using both of the rotated rotation bar and the number of rotations of the rotation bar as the parameters.

In the citation JP60-180472U (Keiko Watanabe), each target blade represents different number of points and the players compete the number of points of the target blade struck by a ball.

The present invention has made possible to enjoy a game of higher grade by using both of the distinction of the rotated rotation bar and the number of rotations.

Claims 4 and 5 have been deleted since there are some similarities between those claims and the above citation. The above amendment does not go beyond the extent of the disclosure of an international application at the time of application.

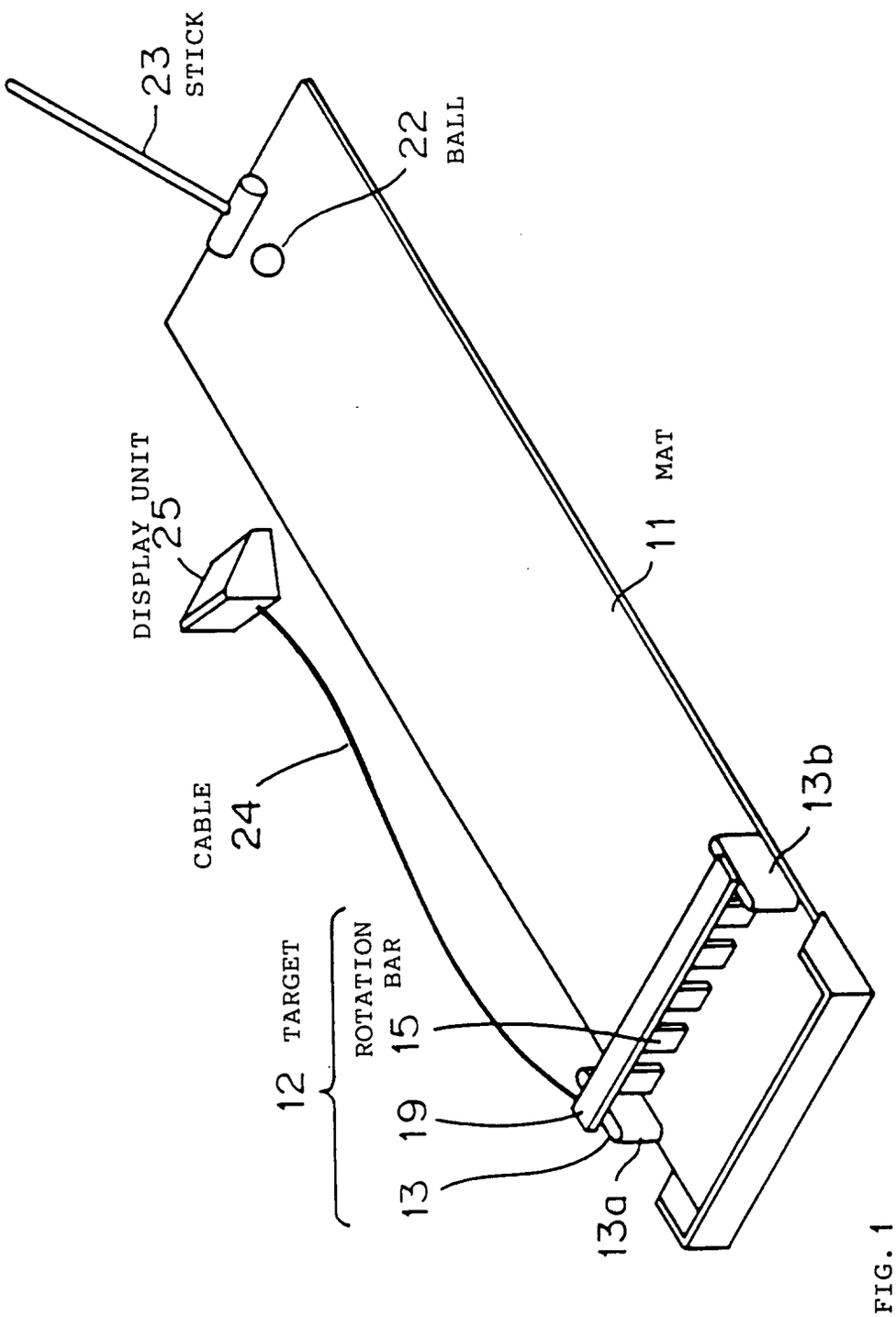

23
STICK
22
BALL
DISPLAY UNIT
25
11
MAT
CABLE
24
13b
12
TARGET
ROTATION
BAR
15
19
13
13a

FIG. 1

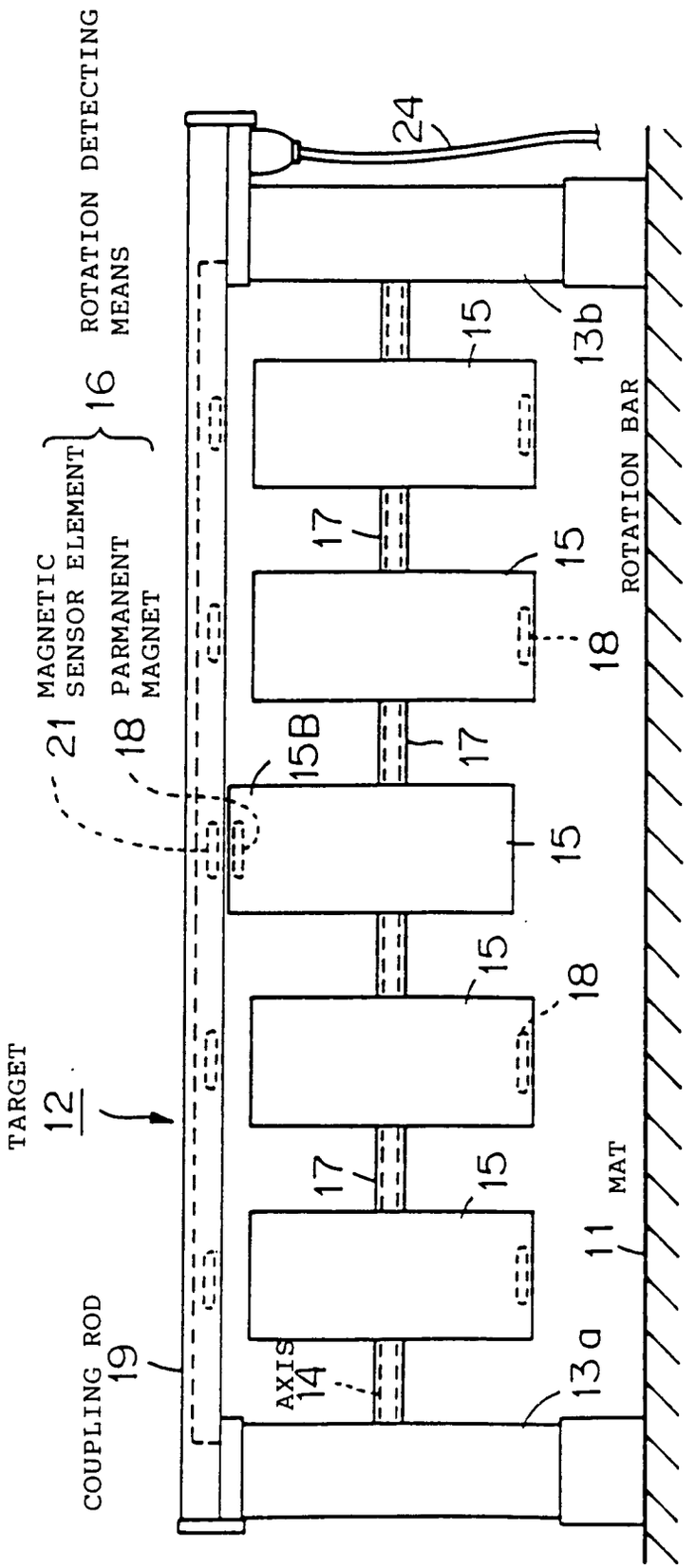

ROTATION DETECTING MEANS
16
MAGNETIC SENSOR ELEMENT
PARMANENT MAGNET
21
18
TARGET
12
COUPLING ROD
19
AXIS
14
MAT
11
ROTATION BAR
24
13b
13a
15
15B
17
18

FIG.2

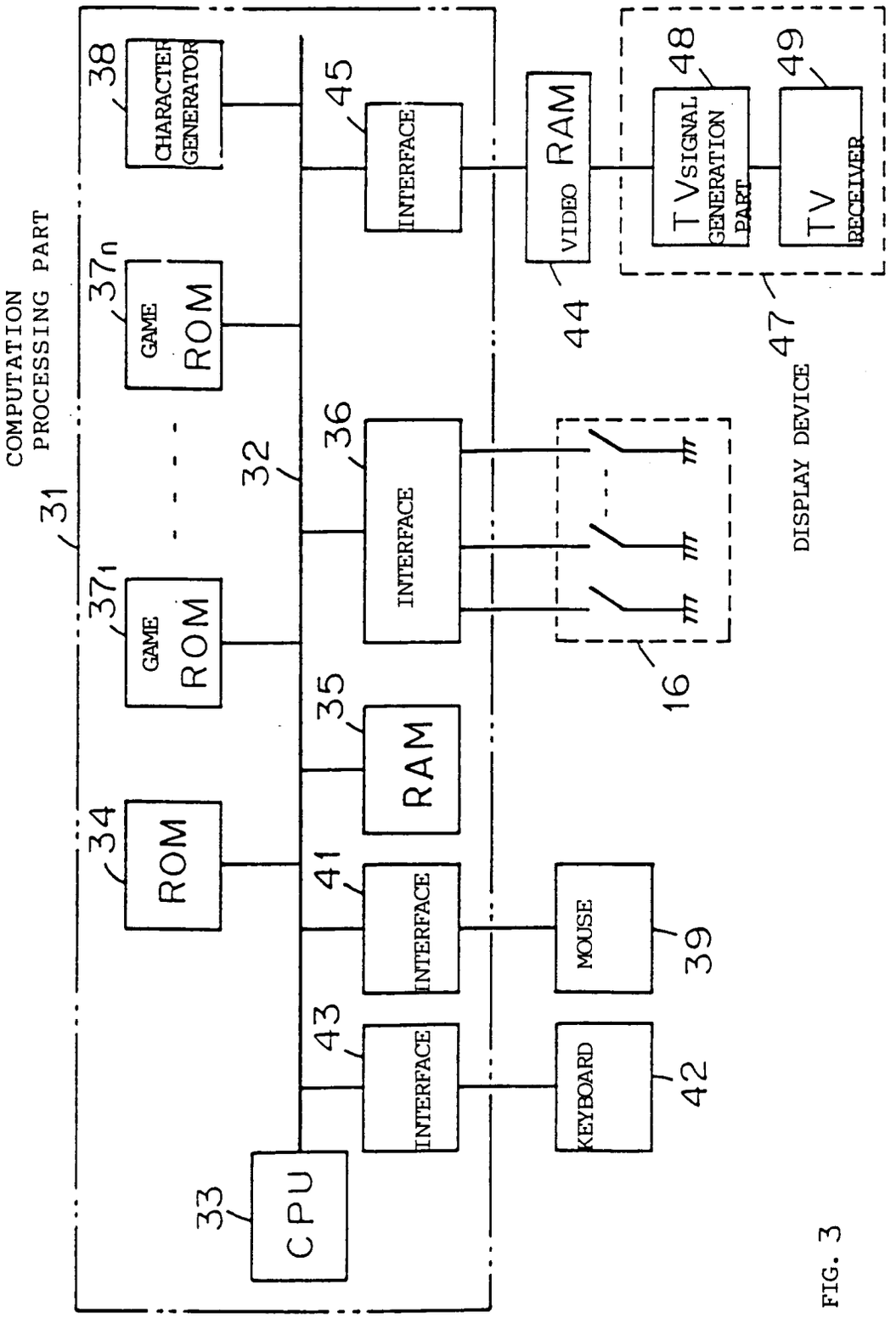

COMPUTATION PROCESSING PART
31
CPU
33
ROM
34
RAM
35
INTERFACE
36
GAME ROM
37n
GAME ROM
37₁
CHARACTER GENERATOR
38
MOUSE
39
KEYBOARD
42
INTERFACE
41
INTERFACE
43
INTERFACE
45
VIDEO RAM
44
TV SIGNAL GENERATION PART
48
TV RECEIVER
49
DISPLAY DEVICE
47
16
32

FIG. 3

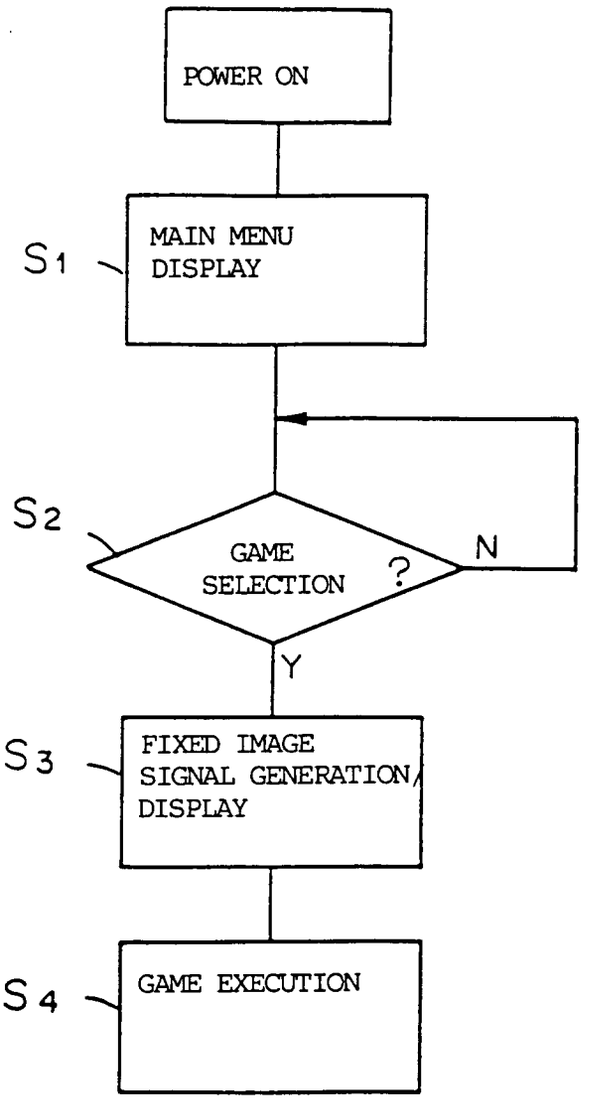

POWER ON
MAIN MENU DISPLAY
S1
S2
GAME SELECTION ?
N
Y
S3
FIXED IMAGE SIGNAL GENERATION/ DISPLAY
S4
GAME EXECUTION

FIG. 4

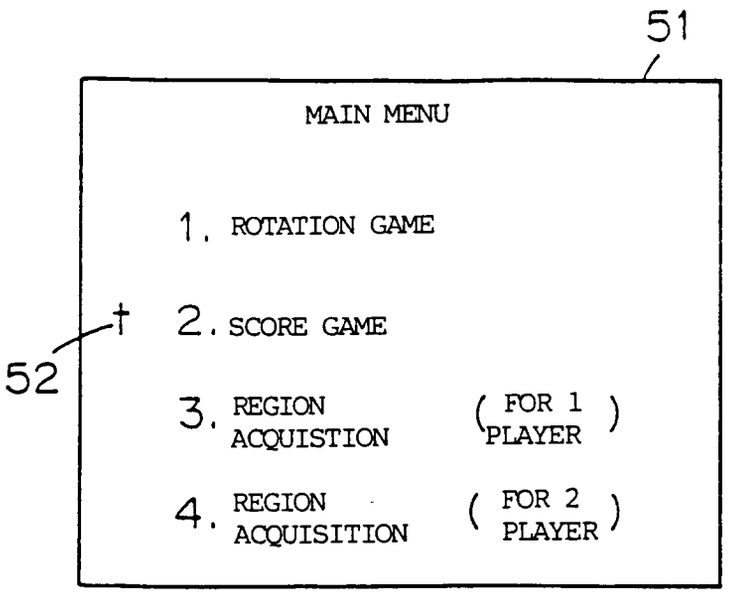

51
MAIN MENU
1. ROTATION GAME
2. SCORE GAME
52
3. REGION ACQUISTION (FOR 1 PLAYER)
4. REGION ACQUISITION (FOR 2 PLAYER)

FIG. 5

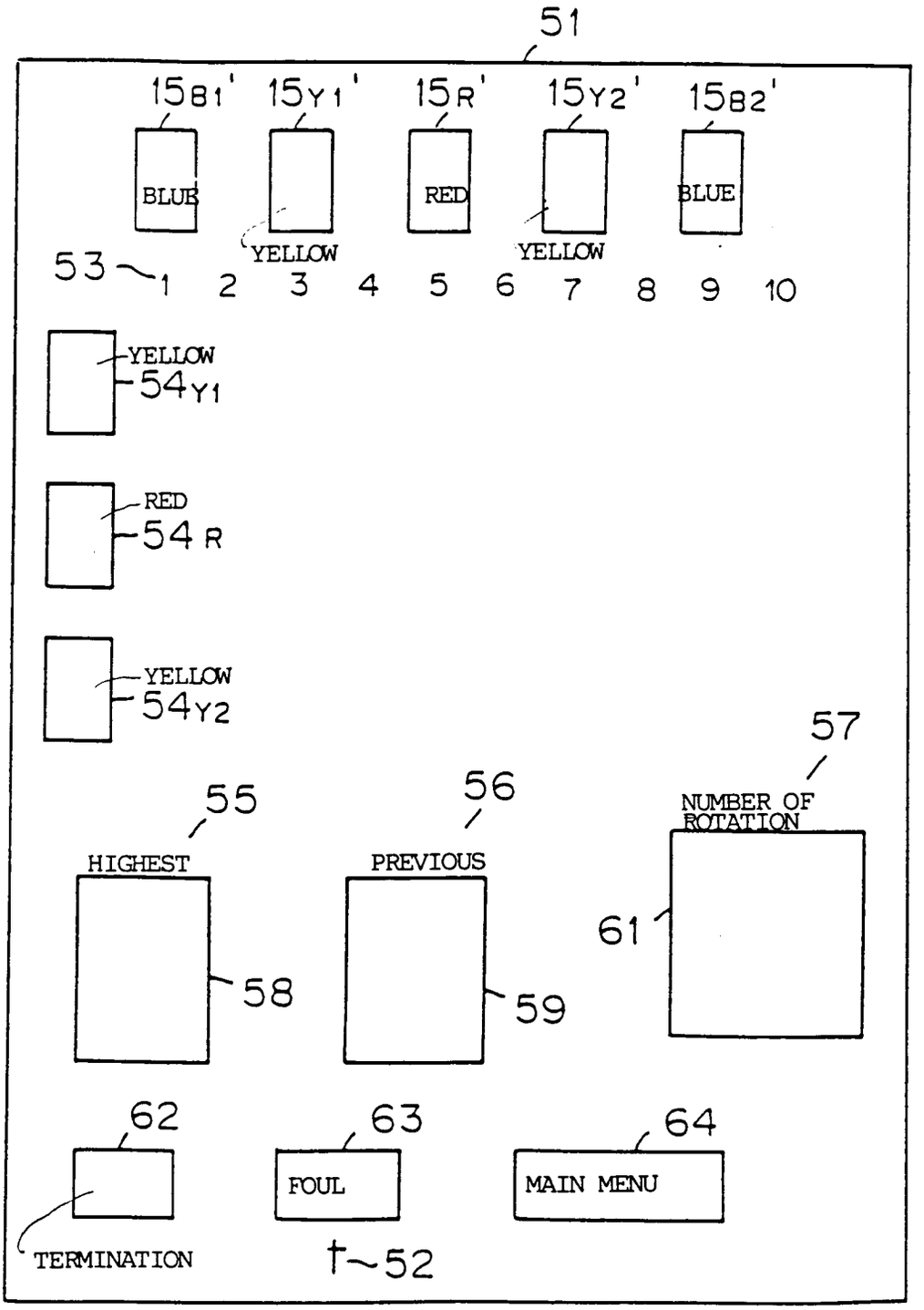

51
15B1'
15Y1'
15R'
15Y2'
15B2'
BLUE
YELLOW
RED
YELLOW
BLUE
53
1 2 3 4 5 6 7 8 9 10
YELLOW
54Y1
RED
54R
YELLOW
54Y2
55
HIGHEST
58
56
PREVIOUS
59
57
NUMBER OF ROTATION
61
62
TERMINATION
63
FOUL
64
MAIN MENU
52

FIG. 6

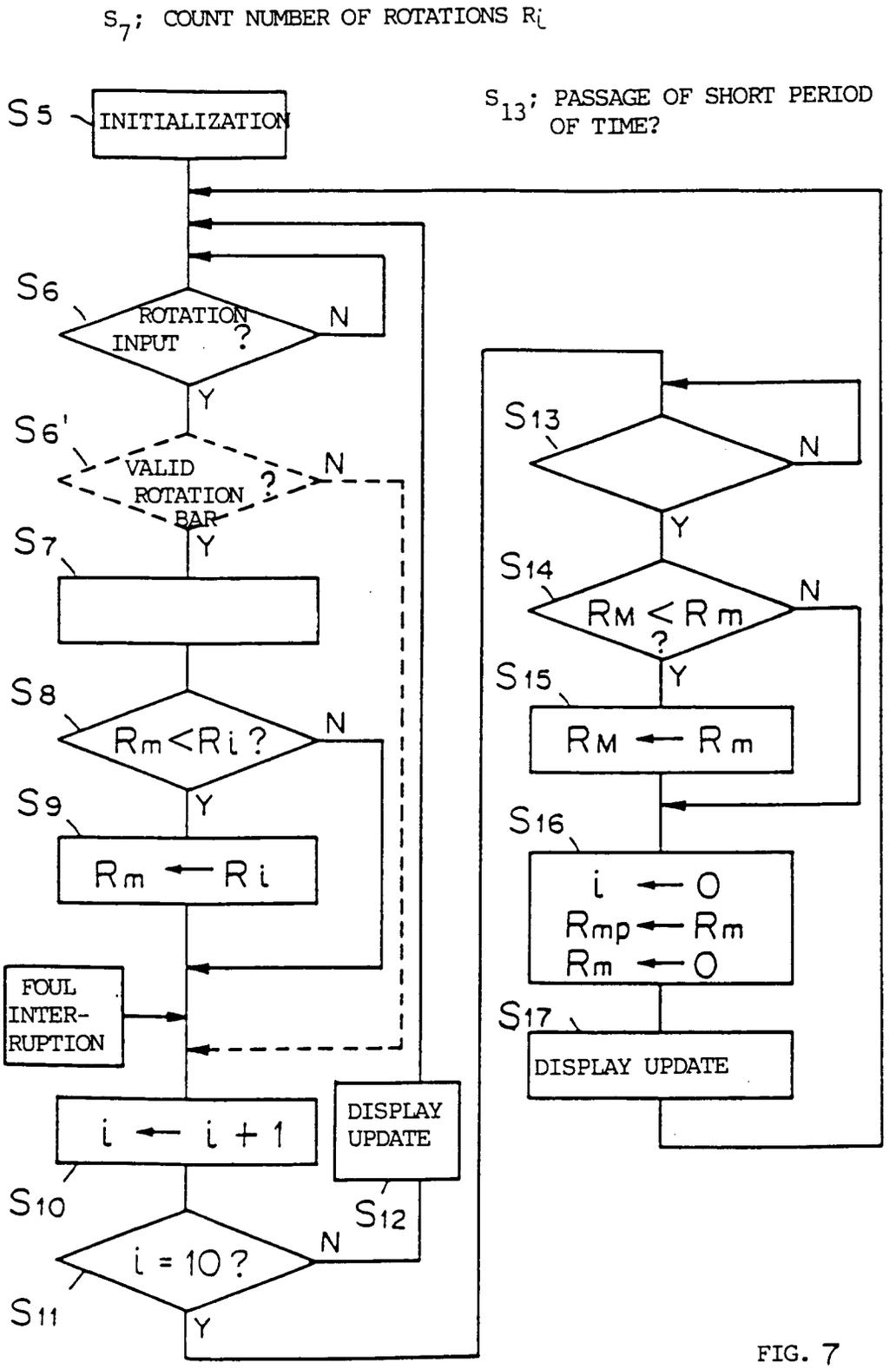

S7; COUNT NUMBER OF ROTATIONS Ri
S13; PASSAGE OF SHORT PERIOD OF TIME?
S5
INITIALIZATION
S6
ROTATION INPUT ?
N
Y
S6'
VALID ROTATION BAR ?
N
Y
S7
S8
Rm<Ri ?
N
Y
S9
Rm ← Ri
FOUL INTER-RUPTION
i ← i + 1
DISPLAY UPDATE
S10
S12
i = 10 ?
N
S11
Y
S13
N
Y
S14
RM ≤ Rm ?
N
Y
S15
RM ← Rm
S16
i ← 0
Rmp ← Rm
Rm ← 0
S17
DISPLAY UPDATE

FIG. 7

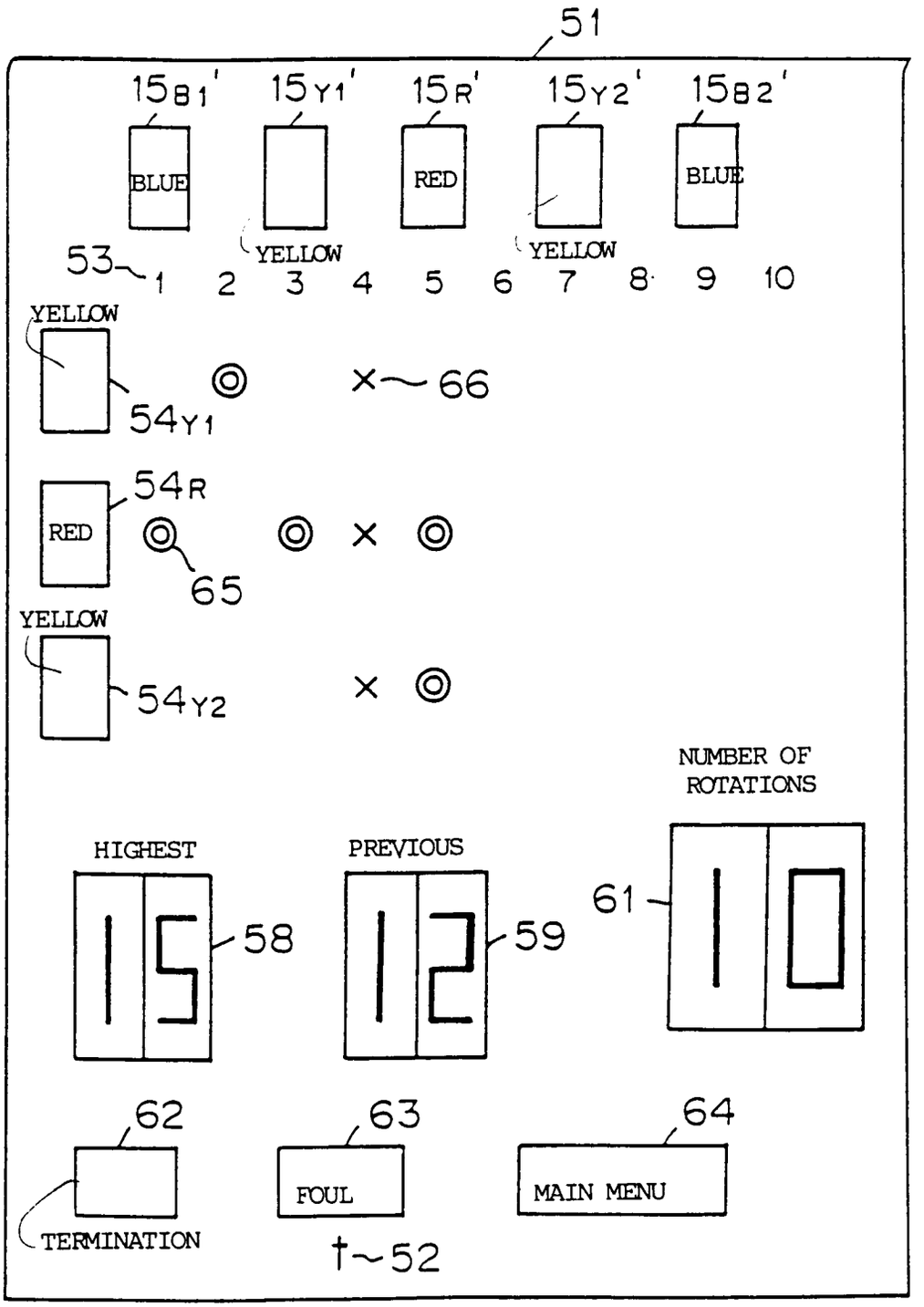

51
15B1'
15Y1'
15R'
15Y2'
15B2'
BLUE
YELLOW
RED
YELLOW
BLUE
53
1 2 3 4 5 6 7 8 9 10
YELLOW
54Y1
66
54R
RED
65
YELLOW
54Y2
NUMBER OF ROTATIONS
HIGHEST
PREVIOUS
61
58
59
62
63
64
FOUL
MAIN MENU
TERMINATION
52

FIG. 8

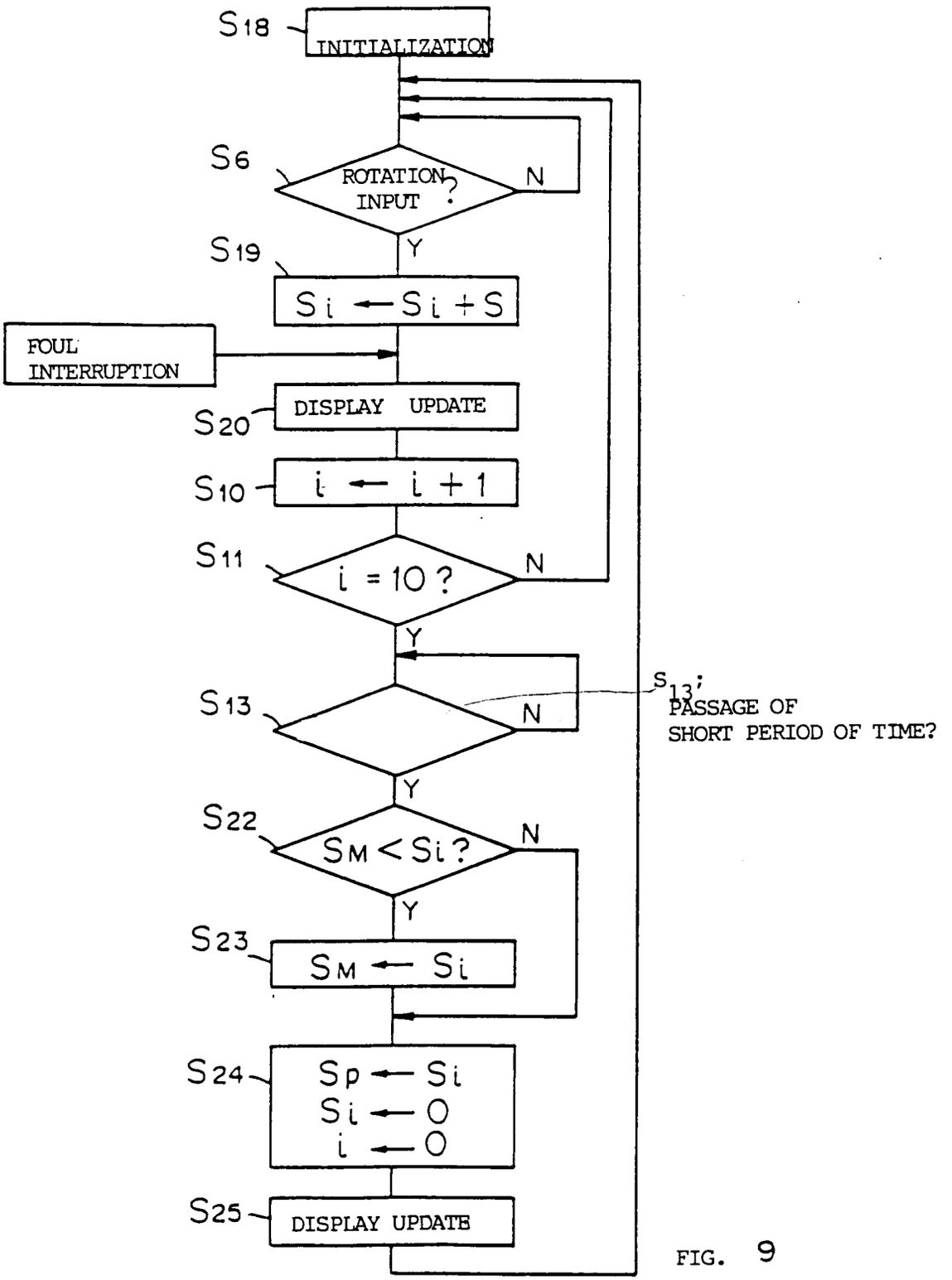

S18
INITIALIZATION
S6
ROTATION INPUT ?
N
Y
S19
Si ← Si + S
FOUL INTERRUPTION
DISPLAY UPDATE
S20
S10
i ← i + 1
S11
i = 10 ?
N
Y
S13
N
Y
S13; PASSAGE OF SHORT PERIOD OF TIME?
S22
SM < Si ?
N
Y
S23
SM ← Si
S24
Sp ← Si
Si ← 0
i ← 0
S25
DISPLAY UPDATE

FIG. 9

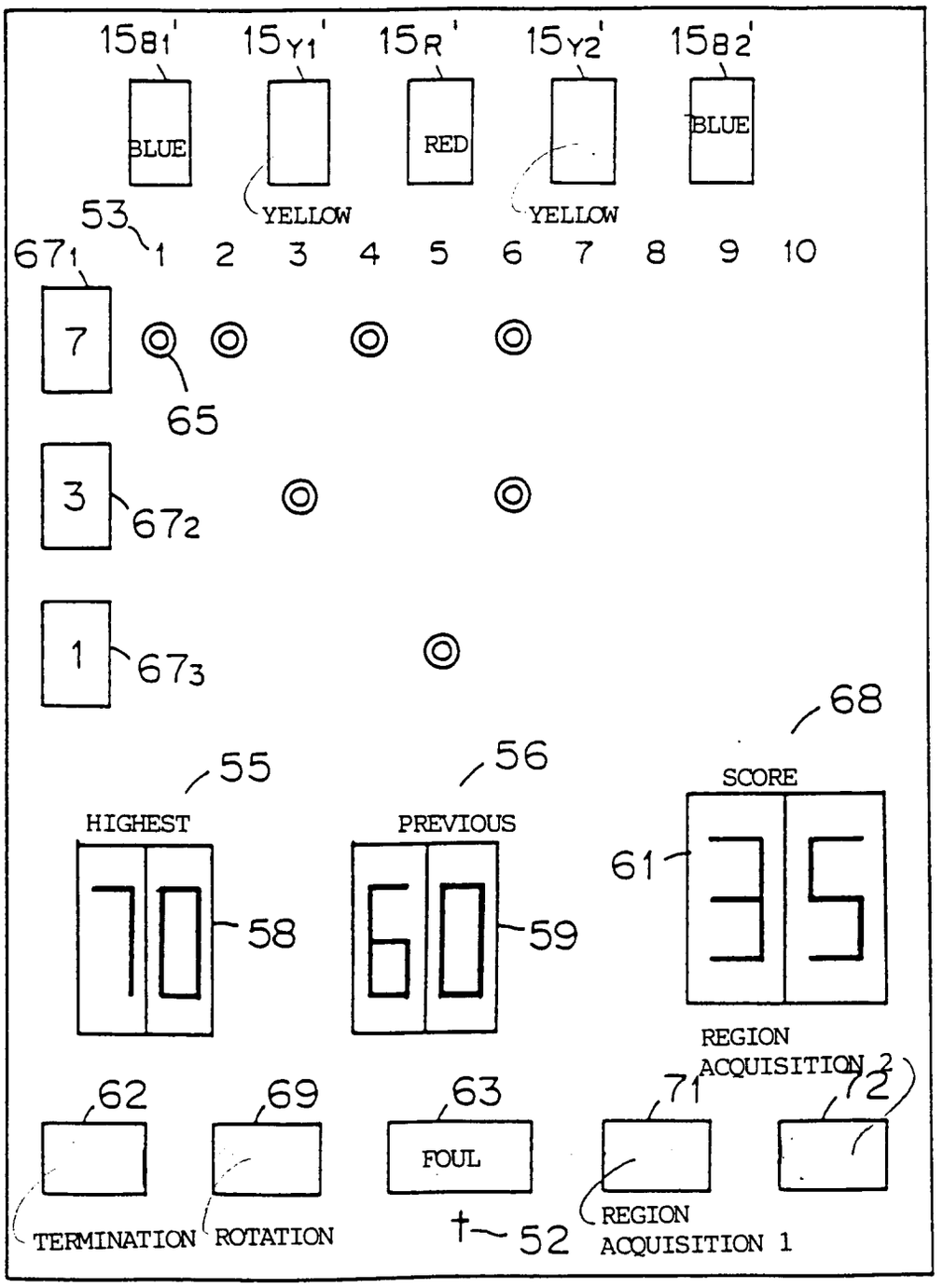

15B1'
15Y1'
15R'
15Y2'
15B2'
BLUE
YELLOW
RED
YELLOW
BLUE
53
1 2 3 4 5 6 7 8 9 10
671
7
65
3
672
1
673
68
55
56
SCORE
HIGHEST
PREVIOUS
61
58
59
REGION ACQUISITION 2
62
69
63
71
72
FOUL
TERMINATION
ROTATION
52
REGION ACQUISITION 1

FIG. 10

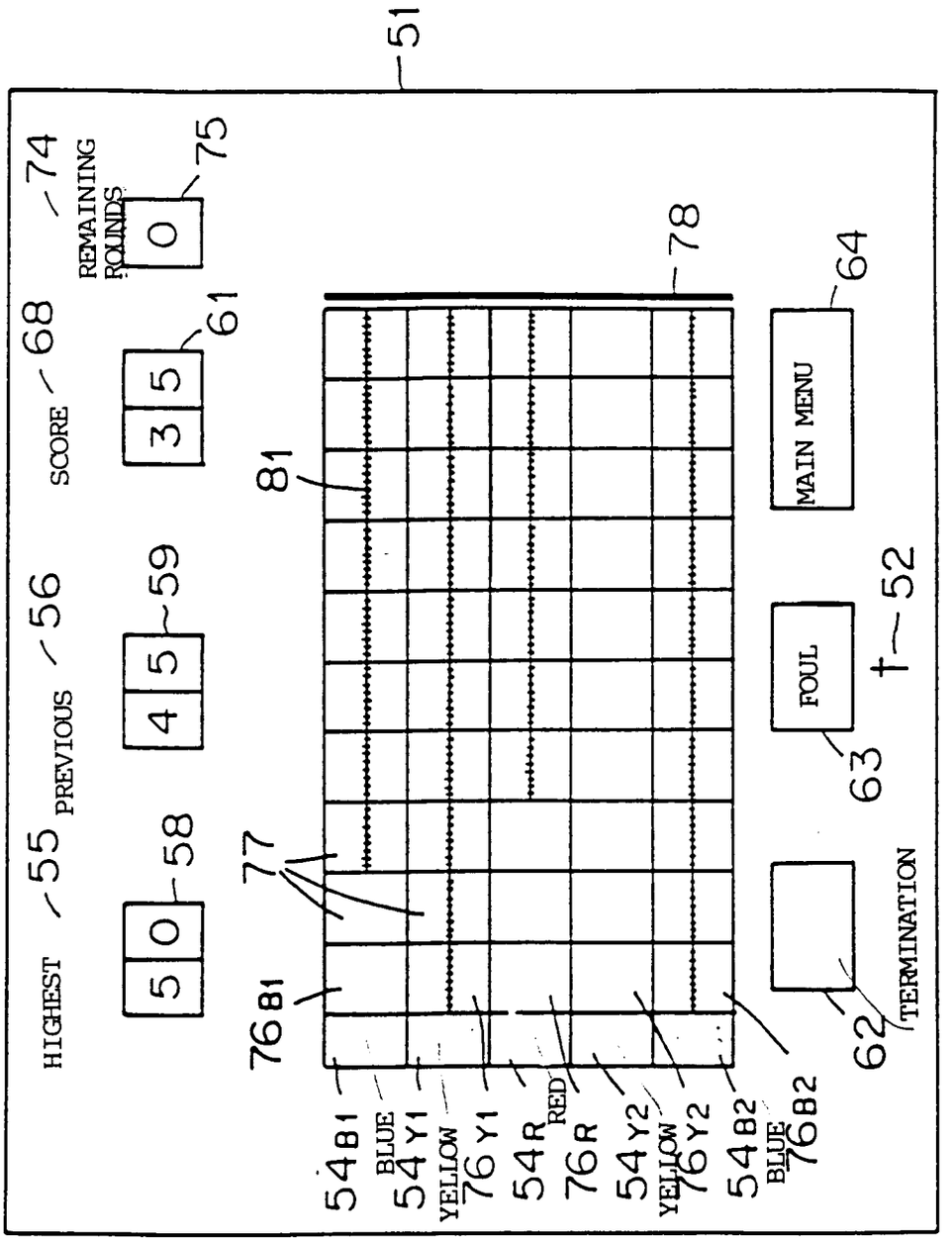

51
74
REMAINING ROUNDS
0
75
SCORE
68
3 5
61
78
64
MAIN MENU
81
HIGHEST
55
PREVIOUS
56
4 5
59
5 0
58
77
FOUL
63
52
76B1
54B1
BLUE
54Y1
YELLOW
76Y1
54R
RED
76R
54Y2
YELLOW
76Y2
54B2
BLUE
76B2
62
TERMINATION

FIG. 11

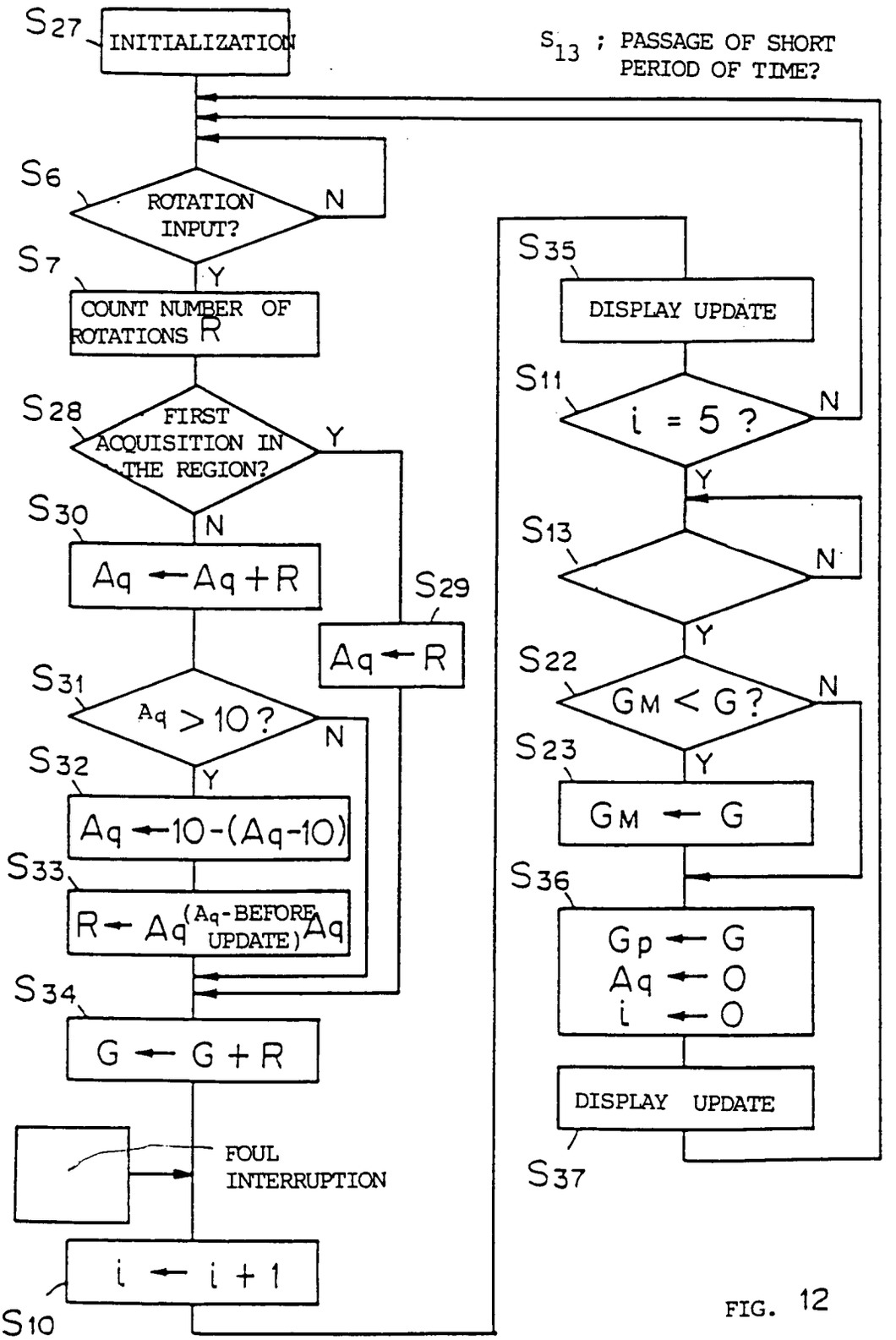

S27
INITIALIZATION
S6
ROTATION INPUT?
N
Y
S7
COUNT NUMBER OF ROTATIONS R
S28
FIRST ACQUISITION IN THE REGION?
Y
N
S30
Aq ← Aq + R
S29
Aq ← R
S31
Aq > 10?
N
Y
S32
Aq ← 10 - (Aq - 10)
S33
R ← Aq (Aq-BEFORE UPDATE) Aq
S34
G ← G + R
FOUL INTERRUPTION
i ← i + 1
S10
S13 ; PASSAGE OF SHORT PERIOD OF TIME?
S35
DISPLAY UPDATE
S11
i = 5 ?
N
Y
S13
N
Y
S22
GM < G?
N
Y
S23
GM ← G
S36
Gp ← G
Aq ← 0
i ← 0
DISPLAY UPDATE
S37

FIG. 12

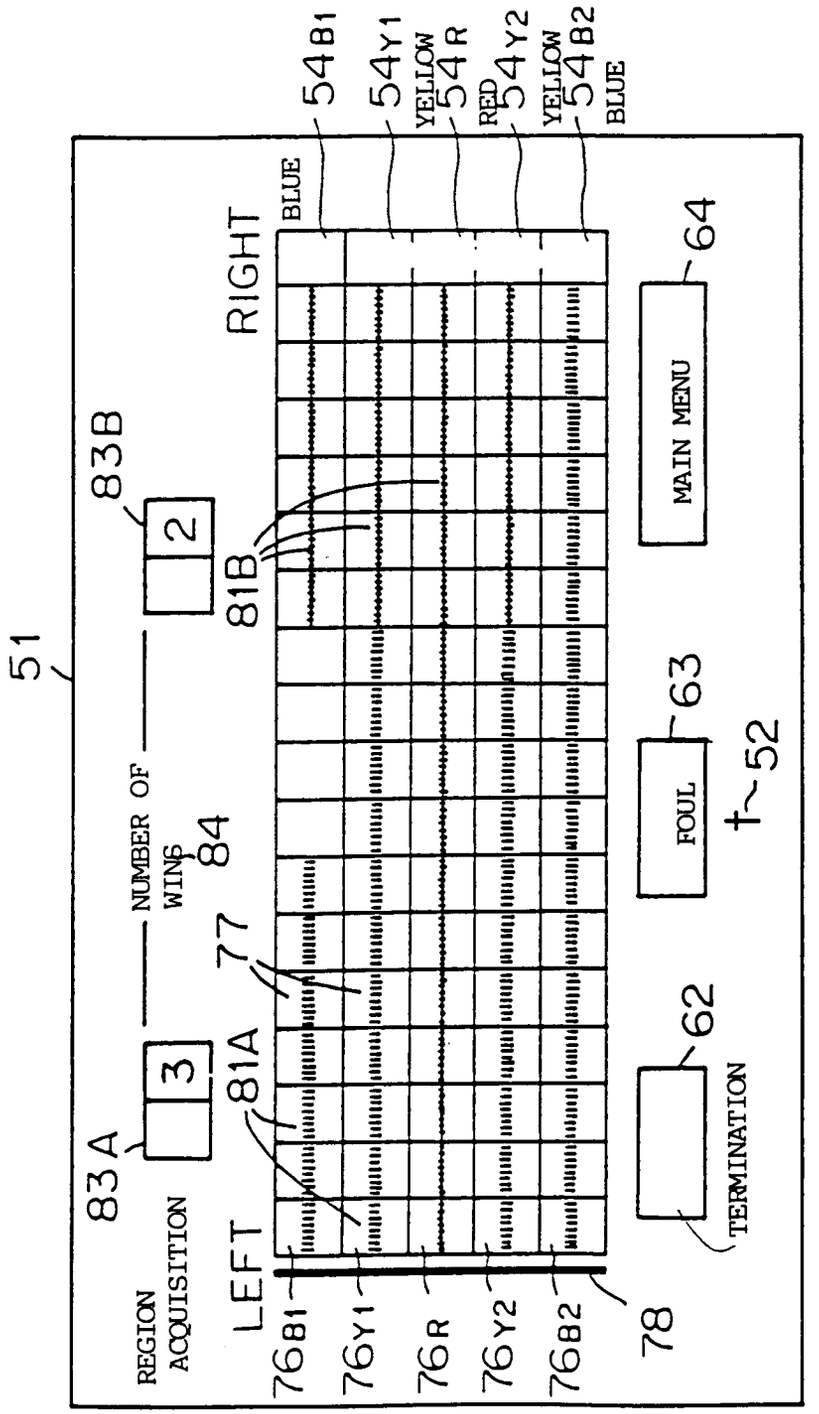
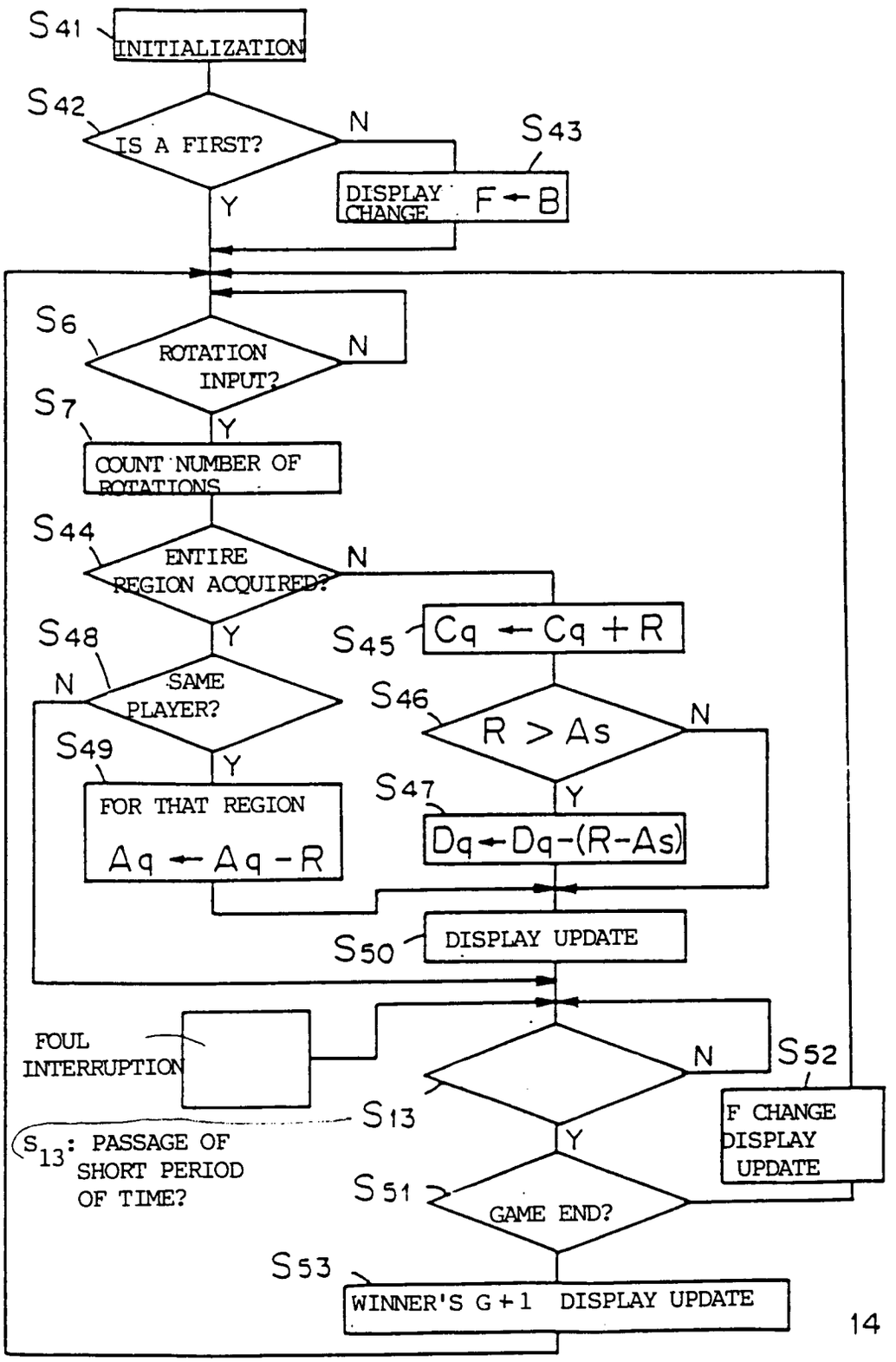

51
83A
3
REGION ACQUISITION
NUMBER OF WINS
84
83B
2
81A
81B
77
LEFT
RIGHT
BLUE
YELLOW
RED
YELLOW
BLUE
54B1
54Y1
54R
54Y2
54B2
76B1
76Y1
76R
76Y2
76B2
78
62
TERMINATION
FOUL
63
52
MAIN MENU
64

FIG. 13


S41
INITIALIZATION
S42
IS A FIRST?
N
S43
DISPLAY CHANGE
F ← B
Y
S6
ROTATION INPUT?
N
S7
Y
COUNT NUMBER OF ROTATIONS
S44
ENTIRE REGION ACQUIRED?
N
Y
S48
N
SAME PLAYER?
S45
Cq ← Cq + R
S46
R > As
N
S49
Y
FOR THAT REGION
Aq ← Aq - R
S47
Y
Dq ← Dq - (R-As)
S50
DISPLAY UPDATE
FOUL INTERRUPTION
N
S52
F CHANGE DISPLAY UPDATE
S13
S13: PASSAGE OF SHORT PERIOD OF TIME?
Y
S51
GAME END?
S53
WINNER'S G + 1 DISPLAY UPDATE
14

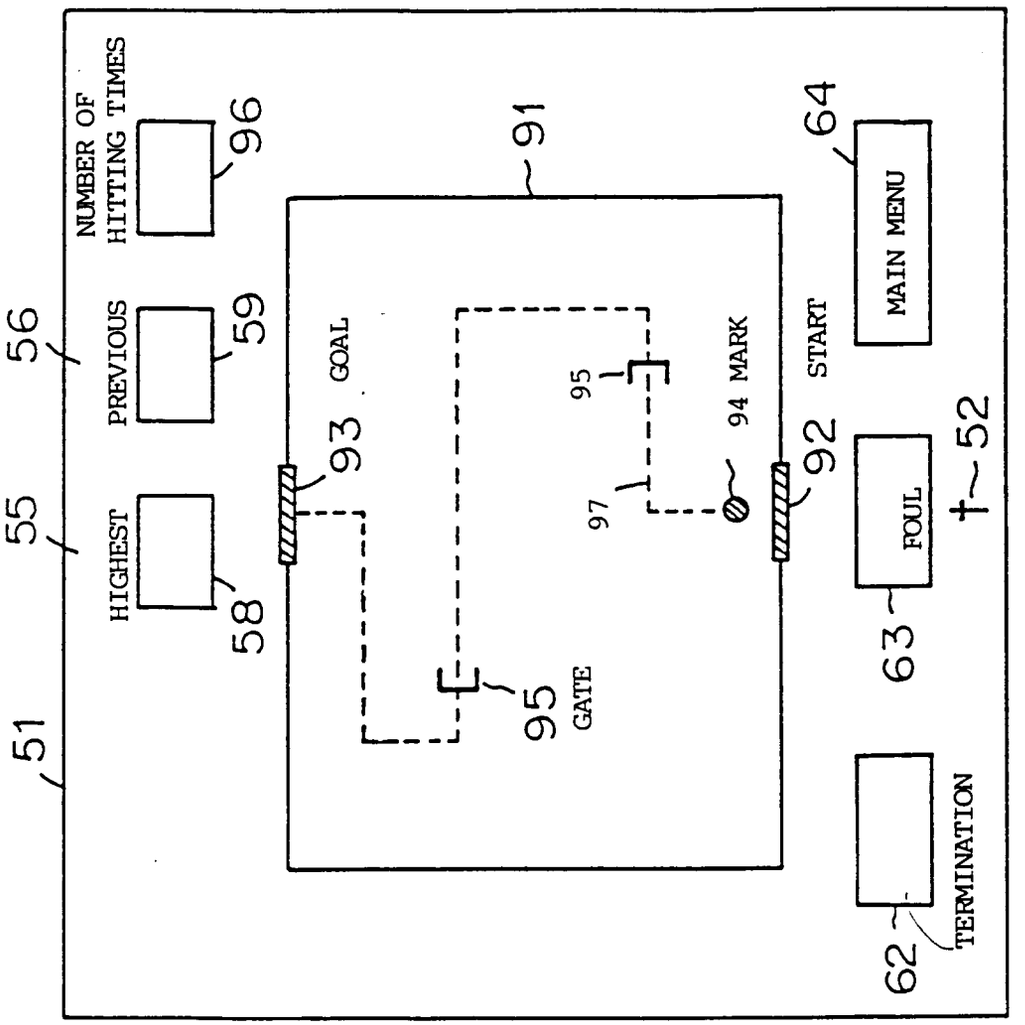

51
55
56
HIGHEST
PREVIOUS
NUMBER OF HITTING TIMES
58
59
96
91
GOAL
93
95
GATE
97
95
94 MARK
92
START
64
MAIN MENU
FOUL
63
52
62
TERMINATION

FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP95/00741

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl^6 A63B67/00, A63B69/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl^6 A63B67/00, A63B69/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922 - 1995
Kokai Jitsuyo Shinan Koho 1971 - 1995
Toroku Jitsuyo Shinan Koho 1994 - 1995

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 55-42675, A,(Yoshihiko Hayashi), March 26, 1980 (26. 03. 80) (Family: none)	1 - 8
Y	JP, 60-6340, U, (Keiko Watanabe), November 30, 1985 (30. 11. 85) (Family: none)	1 - 8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search	Date of mailing of the international search report
May 8, 1995 (08. 05. 95)	May 30, 1995 (30. 05. 95)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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