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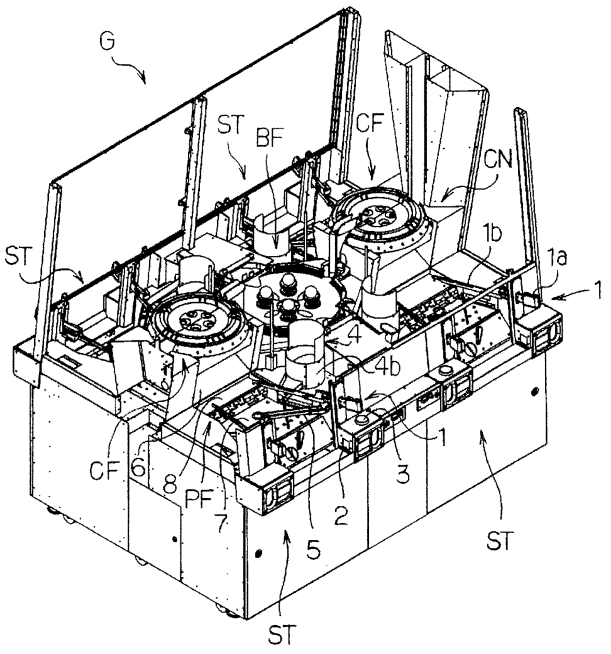
(54) GAME MACHINE

(57) A game machine includes bonus game board surface 41 (a game board surface) on which a fence 43 as a barrier is provided inside an outer periphery and a prize winning opportunity can repeatedly be generated using physical motion of a ball B2 as an object, the fence 43 preventing movement of the ball B2, an out blocker 61 (a discharge adjusting device) that adjusts discharge of the ball B2 from a discharge port 63a provided in a part of the fence 43, and a control unit 91 (a discharge control device) that operates the out blocker 61 to control ease of the discharge of the ball B2.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a game machine in which an object is moved within a game region.

Background Art

[0002] For example, there is well known a game machine in which a player slots a game medium such as a medal to play a predetermined game (for example, see Patent Document 1). In such game machines, the game is played by physically moving an object such as the game medium and a lottery medium within a game region.

[0003] Patent Document 1: Japanese Patent Application Laid-Open No. 2005-224326

Disclosure of the Invention

Problem to be solved by the Invention

[0004] In the game machine in which the physical movement of the object is utilized, because a game content depends on a behavior of the object, a prize winning rate is possibly varied when a slight difference is generated among game machines due to assembly of components in the game machine. Therefore, a profit withdrawal rate is possibly varied among game machines.

[0005] An object of the invention is to provide a game machine that can average the prize winning rate among the game machines.

Means for solving the Problem

[0006] A game machine according to an aspect of the present invention solves the above described problem by comprising: a game board surface on which a barrier is provided inside an outer periphery and a prize winning opportunity can repeatedly be generated using physical motion of an object, the barrier preventing movement of the object; a discharge adjusting device that adjusts discharge of the object from a discharge port provided in a part of the barrier; and a discharge control device that operates the discharge adjusting device to control ease of the discharge of the object.

[0007] In the game machine according to the present invention, the prize winning opportunity is repeatedly generated on the game board surface, so that the number of occurrences of the prize winning opportunity is increased as an existing probability of the object is increased on the game board surface. A time the object exists on the game board surface can be adjusted by controlling the ease of the discharge of the object from the discharge port. The prize winning rate of the game machine can be adjusted by controlling such that the object is easy to discharge in cases where the prize winning rate is high in all the game machines and the object is difficult to discharge in cases where the prize winning rate is low.

[0008] In the game machine according to an aspect of the present invention, the discharge adjusting device may changes a width of the discharge port. Accordingly, the ease of the discharge of the object can be adjusted by changing the area of the discharge port.

[0009] In the game machine according to an aspect of the present invention which changes a width of the discharge port, the discharge adjusting device may be a movable member. Accordingly, the area of the discharge port can be changed by an operation of the movable member, and the ease of the discharge of the object can be adjusted.

[0010] In the game machine according to an aspect of the present invention which provided with the movable member, the movable members may be provided in the discharge port, and the discharge control device may perform control such that the movable members independently appear on a moving surface of the object. Accordingly, the area of the discharge port can finely be adjusted because the movable members provided in the discharge port appear independently of each other, and the prize winning rate can finely be adjusted in all the game machines. Therefore, passion for gambling can be raised in the game.

[0011] In the game machine according to an aspect of the present invention which provided with the movable member, the discharge control device may perform control based on contact of the movable member with the object such that the movable member is sunk from the moving surface. Accordingly, for example, when the object is moved to the discharge port in a second time while the movable member rebounds the object to continue the game on the game board surface in a first time, the movable member is controlled based on the contact with the object such that the movable member is sunk to discharge the object. Therefore, an interest in the game can be enhanced.

[0012] In the game machine according to the aspect of the present invention which provided with the movable member, the discharge control device may perform control based on a time the movable member appears on the moving surface such that the movable member is sunk from the moving surface. Accordingly, because the movable member is sunk based on the movable member appearance time, the movable member is controlled such that the object is held on the game board surface for a predetermined time. Therefore, the prize winning rate can be enhanced for the predetermined time and then the passion for gambling can be raised in the game.

[0013] Thus, in the game machine of the invention, the prize winning opportunity is repeatedly generated on the game board surface, so that the number of occurrences of the prize winning opportunity is increased as the existing probability of the object is increased on the game board surface. The time the object exists on the game

board surface can be adjusted by controlling the ease of the discharge of the object from the discharge port. The prize winning rate of the game machine can be adjusted by controlling such that the object is easy to discharge in cases where the prize winning rate is high in all the game machines and the object is difficult to discharge in cases where the prize winning rate is low.

Brief Description of the Drawings

[0014]

FIG. 1 is an overhead view illustrating a game machine according to an embodiment of the present invention.
FIG. 2 is a top view illustrating a play field in which a game is played.
FIG. 3 is a perspective view of a pusher field portion.
FIG. 4 is a perspective view of a center unit.
FIG. 5 illustrates a detail of a ball input portion.
FIG. 6 illustrates a detail of an internal mechanism of a ball detection portion.
FIG. 7 is a perspective view of a bumper sensor.
FIG. 8 illustrates a detail of an out blocker.
FIG. 9 illustrates a detail of a ball conveying mechanism.
FIG. 10 illustrates a detail of a ball conveying mechanism.
FIG. 11 is a block diagram illustrating a configuration of a control system of the game machine.
FIG. 12 is a flowchart illustrating a digital lottery game.
FIG. 13 is a flowchart illustrating a chance game.
FIG. 14 is a view illustrating a prize winning interval between a bonus game and a chance game.
FIG. 15 is a perspective view of a medal supply portion.

Best Mode for carrying out the Invention

[0015] FIG. 1 is a overhead view illustrating a game machine according to an embodiment of the present invention, and FIG. 2 is a top view illustrating a play field in which a game is played. In FIG. 1, for the sake of convenience, a top portion and a side face portion of a game machine G are partially omitted. The play field of the game machine G is surrounded by a barrier such as a transparent plate, thereby shielding the play field from the outside. The game machine G is a so-called medal game machine in which the medal is used as a game medium. The game machine G includes a center unit CN and four station units ST. Each two of the station units ST are disposed across the center unit CN from each other. A so-called pusher game, in which the medal is used, and a digital lottery game associated with the pusher game are played in the station unit ST. A bonus game is played in the center unit CN in association with the game result in the station unit ST.

[0016] The station unit ST includes a pusher field portion PF in which the pusher game is played, a medal slot potion 1 that supplies the medal to the pusher field portion PF, a medal withdrawal port 2 that withdraws the medal to a player according to the result of the pusher game, an operation button 3 that is used in a bonus game, a medal supply portion 4 serves as a dividend supply device for supplying the medal to the pusher field portion PF according to the result of the bonus game, a ball supply portion 5 that supplies a ball as a lottery medium to the pusher field portion PF according to the result of a digital lottery game, and a display portion 6 on which the digital lottery game and the like are displayed. The pusher field portion PF includes a table 7 and a pusher table 8, in which the medals are stored. The medals are stored in the table 7 and the pusher table 8 so as to be spread over the table 7 and the pusher table 8. The pusher table 8 is reciprocated back and forth on the table 7 (it is assumed that the front is the side on which the player is located, the same holds true for the following description). The medal slot potion 1 includes a medal slot 1a in which the player slots the medal and a rail 1b through which the slotted medal is guided so as to be supplied to the pusher table 8. The medal slot potion 1 is turnably placed in the game machine such that the player can appropriately select a medal launching direction. Because the two medal slot potions 1 are placed in each station unit ST, the game can be played in one station unit ST by up to two players. The medal supply portion 4 includes a hopper 4a (see FIG. 15) serves as a supply device provided in an upper portion of the medal supply portion 4 and a medal receiving member 4b serves as a dividend receiving member. When the medal is withdrawn from the hopper 4a, the medal drops on the medal receiving member 4b, and the medal is supplied to the pusher field portion PF. In the display portion 6, a reflecting mirror reflects a screen displayed on a liquid crystal display device provided above the reflecting mirror, and the screen is displayed to the player. In this case, the liquid crystal display device can be shared with the station unit ST located on the opposite side. The display portion 6 may be a display device such as the liquid crystal display device.

[0017] FIG. 3 is a perspective view illustrating the pusher field portion PF. An inclined portion 11 is provided in front of the pusher table 8 while continuing to the medal storage portion 8a of the pusher table 8. Chance checkers 12 are provided in the inclined portion 11 in order to detect passage of a medal M. Each chance checker 12 includes a lamp 12a that is lit or turned off according to the detection of the medal M. An inclined portion 13 is provided in front of the table 7 while continuing to the medal storage portion 7a of the table 7. The inclined portion 13 includes a start checker 14 and a pair of flippers 15. The start checker 14 detects approach of the medal M. The flippers 15 are provided on both sides of the start checker 14 to guide the medal M to the start checker 14. The start checker 14 detects the approach of the medal

M to an opening portion 14a provided in the inclined portion 13. The pair of flippers 15 is opened and closed according to the result of the pusher game or digital lottery game to change the ease of the approach of the medal M to the start checker 14. The medal M of the chance checker 12 or start checker 14 may be detected by utilizing well-known sensor techniques such as a photoelectric sensor.

[0018] A schematic flow of the medal M in the pusher field portion PF will be described below. When the player slots the medal M in the medal slot 1a, the medal M is guided to the rail 1b to drop on the medal storage portion 8a of the pusher table 8, and the medal M is stored in the medal storage portion 8a or the medal M rolls down from the pusher table 8 to the table 7. The group of medals M stored on the pusher table 8 comes into contact with a wall portion 16 and pushed forward by a reciprocating movement of the pusher table 8. Therefore, the medal M is pushed out from a front end of the pusher table 8, the pushed-out medal M slips off the inclined portion 11 to pass through one of the chance checkers 12, and the medal M is moved to and stored on the table 7.

[0019] The game content played in the passage of the medal M is set to each chance checker 12, and each chance checker 12 is displayed such that the player can notice by the lamp 12a. The flippers 15 are opened and closed according to the setting of the chance checker 12. The group of medals M stored on the table 7 is pushed forward by the reciprocating movement of the pusher table 8. Therefore, the medal M is pushed out from the front end of the table 7, the medal M slips off the inclined portion 13 to drop off, and the medal M is withdrawn from the medal withdrawal port 2 through a count hopper (not illustrated) to the player.

[0020] When the start checker 14 detects the medal M that is pushed out from the front end of the table 7 to go into the start checker 14, the digital lottery game is started. The digital lottery game is a kind of slot game that plays whether a combination of three drawing patterns (such as pictures, symbols, and figures) horizontally displayed in line on the display portion 6 is matched with a predetermined prize. The digital lottery game is coordinated with the chance checker 12 such that a lottery condition is changed according to the setting of the chance checker 12 by which the medal M is detected. A stage management maybe performed such that the digital lottery game is coordinated with the flippers 15. When the predetermined prize is won as a result of lottery to generate a dividend to the player, the dividend is withdrawn from a withdrawal portion 17 provided above the display portion 6. The withdrawn medal M slips off the display portion 6 to drop on the pusher table 8.

[0021] A "ball" is prepared as one of the prizes of the digital lottery game. For example, when the three drawing patterns of the ball are lined up, the prize of the "ball" is won, and a ball B1 is supplied to the table 7 from the ball supply portion 5. The ball B1 may be made of a resin or the like, and the ball B1 may be separated by colors.

[0022] The ball B1 supplied on the table 7 is gradually pushed out toward the front side of the table 7 along with the medals M by the reciprocating movement of the pusher table 8. When the ball B1 drops from the front end of the table 7, the ball B1 slips off the inclined portion 13. Then the slipped-off ball B1 is detected by a detection portion (not illustrated) to give a predetermined dividend to the player. The dividend is withdrawn from the withdrawal portion 17. The well-known sensor techniques such as a photoelectric sensor and a proximity sensor may be used in the detection portion. The slipped-off ball B1 is counted based on the detection result, and the bonus game is started in the center unit CN when the number of balls B1 reaches a predetermined value. The bonus game may be started when the slipped-off ball B1 goes into the start checker 14. A "direct bonus game" may be prepared as one of the prizes of the digital lottery game. For example, when the three letters "D" of the alphabet are lined up, the prize of the "direct bonus game" is won, and the bonus game is started in the center unit CN.

[0023] FIG. 4 is a perspective view illustrating the center unit CN. The center unit CN includes a bonus field portion BF serves as a first game region and a chance field portion CF serves as a second game region. The bonus game is played in the bonus field portion BF. In FIG. 4, the two chance field portions CF are provided in the game machine G, and the chance game associated with the result of the bonus game is played in the chance field portion CF. In the center unit CN, a ball B2 is used as an object. The ball B2 is made of metal. Because the chance field portions CF have similar configurations, only one chance field portion CF is illustrated in FIG. 4.

[0024] A ball input portion 21, a bonus game region A1, an out zone A2, and a ball conveying mechanism 22 are provided in the bonus field portion BF. The ball input portion 21 is used to puts in the ball B2. In the bonus game region A1 serves as a game region, a prize winning opportunity can be generated by the physical motion of the ball B2 put in from the ball input portion 21. The ball B2 is discharged from the bonus game region A1 and stored in the out zone A2. The ball conveying mechanism 22 conveys the ball B2 from the bonus field portion BF to the chance field portion CF.

[0025] FIG. 5 illustrates a detail of the ball input portion 21. The ball input portion 21 includes a launching portion 31 that launches the ball B2 toward the bonus game region A1 and a rail 32 that guides the launched ball B2 to the bonus game region A1. The launching portion 31 includes a push-out member 33 that pushes out the ball B2 and a solenoid 34 that drives the push-out member 33. The push-out member 33 has a U-shape, and pushed out the ball by one of end portions of the push-out member 33 to launch the ball B2. A shaft 33a fixed to the game machine G is provided in a folded portion below the push-out member 33, the push-out member 33 is driven by the operation of the solenoid 34 coupled to the other end portion of the push-out member 33, and one of the end

portions pushes out the ball B2. The solenoid 34 vertically drives an iron core 34a in a reciprocating manner by magnetic excitation of the built-in solenoid coil and release of the magnetic excitation. The iron core 34a is coupled to the other end portion of the push-out member 33. The rail 32 includes a rail bottom 35 and a pair of rail side plates 36a and 36b that are provided perpendicular to the rail bottom 35 on both sides of the rail bottom 35. The rail bottom 35 and the rail side plates 36a and 36b constitute a moving path of the ball B2. An opening 36b1 is provided in part of the rail side plate 36b in order to supply the ball B2 to be launched.

[0026] A bonus game board surface 41 serves as a mortar-shape game board surface, a bumper 42 serves as first game device or a lottery mechanism that is provided on the bonus game board surface 41 to flip the ball B2, and a fence 43 serves as the barrier that surrounds the outer periphery of the bonus game board surface 41 are provided in the bonus game region A1. The bonus game board surface 41 includes a rotating disc 41a (see FIG. 2) that is provided in the center of the bonus game board surface 41 to be rotated and projections 41b that disposed around the rotating disc 41a. The rotating disc 41a is rotated at a predetermined rotating speed to change the moving direction of the ball B2 coming into contact with the rotating disc 41a. A mound may be provided on a surface of the rotating disc 41a. For example, when an S-shape mound 41c is provided, the moving direction of the ball B2 coming into contact with the rotating disc 41a is changed according to rotating timing of the rotating disc 41a. In FIG. 2, the four projections 41b are provided, and the projection 41b has a semi-elliptical shape. The projection 41b changes the moving direction of the ball B2 coming into contact with the projection 41b.

[0027] The bumper 42 is a so-called thumper bumper, and the bumper 42 includes a ball detection portion 42a and a lamp 42b. The ball detection portion 42a serves as an object detection device that detects the ball B2 coming into contact with the ball detection portion 42a. The lamp 42b displays the detection of the ball B2. FIG. 6 illustrates a detail of an internal mechanism of the ball detection portion 42a. The ball detection portion 42a includes a rod 51, a bracket 52, a rod support spring 53, a push-out plate 54, a solenoid 55, an iron core rod 56, a spring 57, a lever 58, and a bumper sensor 59. The rod 51 is vertically provided in the bumper 42. The bracket 52 is provided in the upper portion of the rod 51. The rod support spring 53 serves as a spring that supports the rod 51. The push-out plate 54 serves as a push-out member that is vertically slidable with respect to the bumper 42, and the push-out plate 54 outwardly flicks the ball B2 that is contacted with the push-out plate 54 when being slid downward. The solenoid 55 serves as a drive device for driving the push-out plate 54. The upper end of the iron core rod 56 is fixed to the push-out plate 54, the lower end of the iron core rod 56 is pierced through the solenoid 55, and the iron core rod 56 is lowered by attraction of the solenoid 55 when the solenoid 55 is energized. The spring 57 elevates the iron core rod 56 when the solenoid 55 is not energized. One of end portions of the lever 58 is fixed to the bumper 42. The bumper sensor 59 serves as a detection portion that detects a displacement of the lever 58. The rod 51 is swingably supported by the rod support spring 53. The bracket 52 having a disc shape is fixed to the rod 51 while being able to be swung along with the rod 51. The upper surface of bracket 52 is inclined so as to be elevated toward the center of the bumper 42. The lower surface of the push-out plate 54 is inclined so as to be lowered toward the center of the bumper 42. That is, an interval between the bracket 52 and the push-out plate 54 is narrowed toward the center of the bumper 42. The lever 58 includes a lever center portion 58a, an arm portion 58b, and a detected portion 58c. The lever center portion 58a serves as a mortar-shape center portion. One of end portions of the arm portion 58b is fixed to swingably support the lever center portion 58a. The detected portion 58c is provided in the other end portion. The lever center portion 58a comes into contact with the end portion of the rod 51. The bumper sensor 59 detects a displacement of the detected portion 58c. FIG. 7 is a perspective view of the bumper sensor 59. Various reflection type or transmission type photoelectric sensors are used as the bumper sensor 59. Usually inspection light is blocked. When the detected portion 58c is moved downward, the inspection light is in a non-blocked state, and a signal for detecting the displacement of the detected portion 58c is supplied. The lamp 42b is lit or turned off based on a detection signal supplied from the bumper sensor 59. Therefore, the contact with the ball B2 is displayed to the player.

[0028] The fence 43 is a wall that prevents a deviation of the ball B2 from the bonus game region A1, and the fence 43is partially provided in the outer periphery of the bonus game board surface 41. The fence 43 is made of a resin, rubber, metal, or the like, and the fence 43 rebounds the ball B2 colliding with the fence 43. For example, the fence 43 may be formed by an inclined surface having a steep slant instead of the wall. Even if the ball B2 is moved toward the outside, the ball B2 is accelerated by a gravitational force and returned to the center side. The fence 43 may have any configuration as long as the ball B2 is returned to the center side of the bonus game board surface 41.

[0029] The out zone A2 is provided adjacent to the outer periphery of the bonus game board surface 41. In the illustrated example, the two out zones A2 are provided on both sides across the center of the bonus game board surface 41. An out blocker 61 and a ball storage portion 62 are provided in the out zone A2. The out blocker 61 serves as discharge adjusting device for preventing the discharge of the ball B2 from the bonus game region A1, and the out blocker 61 can appear and disappear from the out zone A2. The ball storage portion 62 stores the discharged ball. FIG. 8 illustrates a detail of the out blocker 61. In FIG. 8, four out blockers 61 are provided. The number of out blockers 61 is not limited to four, how-

ever the out blockers 61 may appropriately be placed according to an area of the out zone A2. The out blocker 61 is placed near a boundary with the bonus game region A1. The out blocker 61 includes a block plate 63 that serves as a movable member for preventing the discharge of the ball B2, a solenoid 64 that drives the block plate 63, a coupling member 65 that couples the block plate 63 and the solenoid 64, and a block sensor 66 that detects collision of the ball B2 with the block plate 63. The block plate 63 is provided in a discharge port 63a in which the fence 43 is not provided, and the block plate 63 vertically appears in and disappears from the ball moving surface of the out zone A2. The solenoid 64 has a configuration similar to that of the solenoid 34 of the ball input portion 21 to reciprocate an iron core 64a. In the embodiment, each block plate 63 is always biased in a direction in which the block plate 63 disappears by a spring (not illustrated), and the block plate 63 is disappears from the ball moving surface by the spring force when the current is not passed through the solenoid 64. When the current is passed through the solenoid 64, the block plate 63 appears on the ball moving surface against the spring force. The coupling member 65 can be rotated around a shaft (not illustrated), and both ends of the coupling member 65 are coupled to block plate 63 and the iron core 64a. The shaft is shared by the out blockers 61. When the iron core 64a is driven by the conduction state or non-conduction state of the solenoid 64, the coupling member 65 is rotated around the shaft while coordinating with the iron core 64a. Therefore, the block plate 63appears and disappears vertically. The block sensor 66 detects the collision of the ball B2 with the block plate 63 by a limit switch. Various well-known techniques such as a sensor and a switch may be used in the block sensor 66. The ball B2 is passed through the out blocker 63 while the movement is not prevented because the out blocker 63 disappears, and the ball B2 is stored in the ball storage portion 62. As illustrated in FIG. 5, the ball storage portion 62 is provided adjacent to the ball input portion 21. The ball storage portion 62 is configured such that the stored ball B2 is guided to the opening 36b1 of the rail 32 of the ball input portion 21.

[0030] FIGS. 9 and 10 illustrate a detail of the ball conveying mechanism 22. FIG. 9 illustrates the ball conveying mechanism when viewed from the right front side, and FIG. 10 illustrates the ball conveying mechanism when viewed from the right rear side. The ball conveying mechanism 22 is provided adjacent to the outer periphery of the bonus game board surface 41. The ball conveying mechanism 22 includes a drop hole 71 in which the ball B2 can drop, a conveying rod 72 that conveys the dropped ball B2 to the chance field portion CF, and a linear drive mechanism 73 that vertically drives the conveying rod 72. The drop hole 71 is provided on a surface connected to the ball moving surface of the bonus game board surface 41, and the ball B2 moved from the bonus game region A1 can drop in the drop hole 71. The drop hole 71 includes a drop sensor (not illustrated) that detects the drop of the ball B2. Various well-known techniques such as a photoelectric sensor may be used in the drop sensor. The conveying rod 72 is vertically driven to appear from and disappear in the drop hole 71. The conveying rod 72 is located below the drop hole 71 to wait for the dropped ball B2, and the conveying rod 72 is driven upward to convey the ball B2 to the chance field portion CF based on the detection signal supplied from the drop sensor. A ball conveying surface 72a (see FIG. 4) of the conveying rod 72 is obliquely cut such that the side of the chance field portion CF is lowered. The ball B2 is stably placed on the ball conveying surface 72a and conveyed, while the ball B2 is supported by a ball support member 72b (see FIG. 4) provided along the conveying rod 72 on the side of the chance field portion CF. The linear drive mechanism 73 includes a rail 73a that is vertically fixed, a slider 73b that can be moved along the rail 73a, and a motor 73c that drives the slider 73b. Various commercially available electric motors may be used as the motor 73c. A linear actuator or a linear motor may be used as the linear drive mechanism 73. The conveying rod 72 is fixed to the slider 73b, and the slider 73b is moved along the rail 73a by the operation of the motor 73c, thereby driving the conveying rod 72.

[0031] A configuration of the chance field portion CF will be described with reference to FIG. 4. The chance field portion CF includes a chance game board surface 81 serves as a rotatable second game device and lottery holes 82 that are provided near the center of the chance game board surface 81. On the chance game board surface 81, a slope is formed so as to be lowered toward the center. The chance game board surface 81 is rotated by a motor (not illustrated) or the like. The lottery hole 82 has a size in which the ball B2 can drop, and the lottery hole 82 includes a lottery hole sensor 82a that detects the dropped ball B2. Various well-known techniques such as a photoelectric sensor may be used in the lottery hole sensor 82a. The game content is changed according to the setting of the lottery hole 82 in which the ball B2 drops.

[0032] A schematic flow of the ball B2 in the center unit CN will be described. When the bonus game is started, the ball B2 is supplied to the ball input portion 21 from the ball storage portion 62. When the player presses the operation button 3, the launching portion 31 launches the ball B2 to the bonus game region A1. The moving direction of the launched ball B2 is changed on the bonus game board surface 41 while the ball B2 comes into contact with the rotating disc 41a and projection 41b, and the ball B2 comes repeatedly into contact with and collides with the bumper 42 and the fence 43. The dividend to the player is generated when the ball B2 comes into contact with the bumper 42. A predetermined number of medals M are supplied to the table 7 from the medal supply portion 4. In the bonus game region A1, the ball B2 can come into contact with the bumper 42 plural times.

[0033] At the beginning of the bonus game, a predetermined number of block plates 63 of the out blocker 61 appear with respect to the out zone A2 so as to prevent

the discharge of the ball B2. When the ball B2 comes into contact with the block plate 63, the block plate 63 disappears with respect to the out zone A2. Therefore, at a first time, the ball B2 going to the out zone A2 is prevented from being discharge to the out zone A2 by the out blocker 61. However, the block plate 63 disappears due to the contact at the first time. When the ball B2 goes to the out zone A2 at a second time, the ball B2 is directly moved to the ball storage portion 62 while the movement of the ball B2 is not obstructed by the out blocker 61, and the bonus game is ended.

[0034] In the bonus game, when the ball B2 drops in the drop hole 71 of the ball conveying mechanism 22, the ball B2 is conveyed to the chance field portion CF to start the chance game. The chance game is a so-called roulette game in which the ball B2 is used. In the chance game, the conveyed ball B2 is put in the chance game board surface 81, and the ball B2 is gradually moved to the center while circling by the rotation of the chance game board surface 81, and the ball B2 drops in one of the lottery holes 82. The game content is changed according to the setting of the lottery hole 82 in which the ball B2 drops. The dividend may be generated to the player. The ball B2 that drops in the lottery hole 82 is returned to the bonus game region A1 from the ball return portion 83 (see FIG. 4), and the bonus game is resumed. The bonus game may be resumed by putting in the ball B2 from the ball input portion 21. The conveying rod 72 of the ball conveying mechanism 22 may appear from the drop hole 71 according to the setting. In such cases, the transition to the chance game is prevented because the ball B2 does not drop in the drop hole 71. Therefore, the lottery probability can be adjusted.

[0035] A configuration of a control system of the game machine G will be described below. FIG. 11 is a block diagram illustrating the configuration of the control system of the game machine G. The game machine G includes a control unit 91 that performs various control processes in order to play a predetermined game. The chance checker 12, the start checker 14, the bumper sensor 57, the lottery hole sensor 82a, and the operation button 3 serve as input devices to the control unit 91 are connected to the control unit 91. The ball supply portion 5, the display portion 6, the withdrawal portion 17, the medal supply portion 4, the ball input portion 21, and the out blocker 61 serve as control targets of the control unit 91 are connected to the control unit 91.

[0036] The digital lottery game performed by the control unit 91 will be described with reference to FIG. 12. The digital lottery game is played on the condition that the start checker 14 detects the medal M. In Step S1, the control unit 91 performs the slot lottery. Each of the three drawing patterns is determined using a random number and the like. In Step S2, as a result of the slot lottery, the control unit 91 determines whether the prize of the "ball" is won. When the prize of the "ball" is won, the control unit 91 goes to Step S3, the control unit 91 directs the ball supply portion 5 to supply the ball B1, and the present process is ended. When the prize of the "ball" is not won in Step S2, the control unit 91 goes to Step S4, and the control unit 91 determines whether the prize of the "direct bonus game" is won. When the prize of the "direct bonus game" is won, the control unit 91 goes to Step S5, the control unit 91 provides an instruction to start the bonus game in the bonus game region A1, and the present process is ended. When the prize of the "direct bonus game" is not won in Step S4, the control unit 91 performs a process according to the result of the slot lottery in Step S6. When the prizes are not won, the control unit 91 performs nothing, and the present process is ended. When the predetermined prize is won, the control unit 91 changes the game content according to the prize, and the present process is ended.

[0037] Intheabove-describedprocess, the transition to the bonus game is made based on the lottery result of the digital lottery game. Because the bonus game is positioned as a specific benefit in the digital lottery game, the player is motivated to play the digital lottery game.

[0038] The chance game performed by the control unit 91 will be described with reference to FIG. 13. The chance game is played on the condition that the drop sensor of the ball conveying mechanism 22 detects the ball B2 to convey the ball B2 from the bonus field portion BF to the chance field portion CF. In Step S11, the control unit 91 performs the roulette lottery. The ball B2 drops in one of the lottery holes 82, and the lottery hole sensor 82a detects the ball B2. In Step S12, the control unit 91 performs a process according to the result of the roulette lottery, and the present process is ended. The control unit 91 changes the game content based on the setting of the lottery hole sensor 82a that detects the ball B2. Examples of the prize may include a lottery game in which the player expects the high dividend and the withdrawal of the medal M. A game that the players of all the station units ST can participate may be played in the center unit CN.

[0039] In the above-described process, the chance game that is different from the bonus game is started during the bonus game. The chance game is positioned as a specific benefit in the bonus game, and the dividend opportunity is further provided to the player. Therefore, the player is motivated to play the bonus game.

[0040] A prize winning interval between the bonus game and the chance game will be described with reference to FIG. 14. FIG. 14 is a view schematically illustrating a relationship between the prize winning interval between the two games and a dividend amount. In the bonus game, when the ball B2 comes into contact with the bumper 42, the prize is won to generate the dividend to the player. When the ball B2 comes into contact with the bumper 42, the bumper 42 flips the ball B2, so that the ball B2 can repeatedly come into contact with the bumper 42 while moving on the bonus game board surface 41. Therefore, a prize winning interval Pn from the prize to the next prize is shortened. A dividend amount N may be relatively small. That is, a small amount of dividend is

generated plural times, and the expectation of the player for the continuous prize winning is enhanced while the dividend is restrained, so that the interest in the game can be increased.

[0041] In the chance game, a lottery time Lm necessary for the lottery until the ball B2 drops in the lottery hole 82 since the ball B2 is put on the chance game board surface 81 is longer than the prize winning interval Pn of the bonus game. A dividend amount M is also larger than the dividend amount N of the bonus game. Therefore, because speedy development of the game is provided in the bonus game while the slow lottery is performed in the chance game, the game attracts the player while the development of the game is not monotonized, and the interest in the game can be increased.

[0042] An operation of the out blocker 61 will be described with reference to FIGS. 4 and 8. The out blocker 61 acts as a discharge adjusting device for adjusting the discharge of the ball B2 from the discharge port 63a. The control unit 91 acts as a discharge control device for operating the out blocker 61 to control the ease of the discharge of the ball B2. When the ball B2 comes into contact with the block plate 63, the ball B2 is rebounded by the block plate 63 to continue the bonus game in the bonus game region A1. On the other hand, the block plate 63 supplies a signal when the block sensor detects the contact with the ball B2. The solenoid 64 is operated based on the output signal, and the solenoid 64 drives the block plate 63 such that the block plate 63 disappears from the ball moving surface of the bonus field portion BF. The ball B2 can be passed through the portion in which the block plate 63 disappears, and the ball B2 is discharged to the out zone A2 when coming to the portion again. The block plates 63 can individually be operated. The player becomes difficult to play the game in the bonus game region A1 as the number of disappeared block plates 63 is increased.

[0043] At the beginning of the bonus game, the number of appearing block plates 63 may be determined according to the result of the digital lottery game. For example, the control unit 91 may control the out blocker 61 in a normal state such that the two block plates 63 are caused to appear at the beginning of the bonus game, and the control unit 91 may control the out blocker 61 in a probability fluctuating state in which the prize winning probability is set higher such that the four block plates 63 are caused to appear at the beginning of the bonus game. The prize winning probability can be controlled in the bonus game by changing the number of appearing block plates 63 at the beginning of the bonus game. The control unit 91 may control the out blocker 61 such that the number of contacts of the ball B2 is set to plural times until the block plate 63 disappears. When the movement of the ball B2 is obstructed by the block plate 63 , the existing probability of the ball B2 is increased on the bonus game board surface 41, thereby increasing the prize winning opportunity. In addition to the limitation to the number of contacts, the control unit 91 may control the prize winning probability in the bonus game by setting an appearance time of the block plate 63 to a predetermined time. Thus, because the prize winning probability can be varied in the bonus game according to the appearance condition of the out blocker 61, the passion for gambling can be raised in the game, and the interest in the game can be increased. Further, even if the lottery rate is varied among the game machines G due to the variation in accuracy of components constituting the game machine G, the ease of the discharge of the ball B2 is controlled by the control unit 91 as described above, so that the adjustment of the lottery probability can be achieved.

[0044] An operation of the bumper 42 will be described with reference to FIGS. 4 and 6. When the ball B2 comes into contact with the bumper 42 to go into between the bracket 52 and the push-out plate 54, the ball B2 pushes the bracket 52 in the downward direction. Because the rod 51 is inclined toward the direction in which the ball B2 goes into the bracket 52 to move a contact point between the rod 51 and the lever 58, the lever center portion 58a of the lever 58 is pushed by the rod 51, the arm portion 58b is elastically deformed to move the detected portion 58c in the downward direction. The bumper sensor 59 detects the displacement of the detected portion 58c, thereby detecting the contact of the bumper 42 with the ball B2. Because the lever center portion 58a that is of the contact point with the end portion of the rod 51 has a mortar shape, the lever center portion 58a can deal with the contact of the bumper 42 with the ball B2 from all the directions, and the detected portion 58c of the lever 58 can be moved downward from all the directions. The solenoid 55 is energized in conjunction with detection of the contact of the bumper 42 with the ball B2, and the iron core rod 56 is attracted downward. When the iron core rod 56 is attracted downward, the push-out plate 54 fixed to the upper end of the iron core rod 56 is slid downward, the ball B2 is pushed out and flicked to the outward direction by the slant surface of the peripheral edge of the push-out plate 54. When the ball B2 is flicked, the bracket 52, the rod 51, and the lever 58 are returned to the original positions, the bumper sensor 59 does not detect the displacement of the detected portion 58c, the energization of the solenoid 55 is released, and the iron core rod 56 is returned to the original position by the restoring force of the spring 57, whereby the push-out plate 54 is slid upward and returned to the original position.

[0045] When the bumper sensor 59 detects the contact with the ball B2, the control unit 91 directs the medal supply portion 4 to supply the medal M. FIG. 15 is a perspective view of the medal supply portion 4. The medal supply portion 4 is placed between the pusher field portion PF and the bonus field portion BF. That is, the medal supply portion 4 is placed at the position where the medal supply portion 4 comes into sight of the player when the player sees the bonus field portion BF. When the medal M is withdrawn from the hopper 4a, the stage management is performed such that the medal M drops before

the player' s eyes, and the medal M is supplied to the table 7 through the medal receiving member 4b. Therefore, the withdrawal of the medal M can effectively be stage-managed to the player, and the interest in the game can be increased.

[0046] The present invention is not limited to the embodiment described above, however various modifications can be made without departing from the scope of the present invention. In the embodiment, the out blocker 61 is used as the discharge adjusting device. For example, the block plate may obstruct the ball so as to be horizontally slid. Even in such cases, the area of the discharge port can be changed to control the ease of the discharge of the ball. The invention is not limited to the change in area of the discharge port. For example, when the ball comes into contact with an openable door provided in the discharge port, the door may fall to discharge the ball, or the door may be opened to discharge the ball. When the doors are provided, the player does not find which door obstructs the discharge of the ball by looking at, so that the interest in the game can be increased. An openable hole may be provided in the discharge port, and the ball may be discharged by causing the ball to drop in the hole. The slant may be provided to change the inclination, thereby adjusting the discharge of the ball. The ball may be attracted by an electromagnetic force. Thus, any configuration may be adopted, as long as the movement of the ball can be obstructed, and as long as a degree of the obstruction can be controlled.

[0047] In the embodiment, the bonus game is ended by discharging the ball B2 to the out zone A2. For example, a game in which the player expects a high dividend may be played in the out zone A2. In such cases, the expectation for high dividend is enhanced by discharging the ball B2, and the interest in the game can be increased.

Claims

1. A game machine comprising:

a game board surface on which a barrier is provided inside an outer periphery and a prize winning opportunity can repeatedly be generated using physical motion of an object, the barrier preventing movement of the object;
a discharge adjusting device that adjusts discharge of the obj ect from a discharge port provided in a part of the barrier; and
a discharge control device that operates the discharge adjusting device to control ease of the discharge of the object.

2. The game machine according to claim 1, wherein the discharge adjusting device changes a width of the discharge port.

3. The game machine according to claim 2, wherein the discharge adjusting device is a movable member.

4. The game machine according to claim 3, wherein the movable members are provided in the discharge port, and the discharge control device performs control such that the movable members independently appear on a moving surface of the object.

5. The game machine according to claim 3 or 4, wherein the discharge control device performs control based on contact of the movable member with the object such that the movable member is sunk from the moving surface.

6. The game machine according to claim 3 or 4, wherein the discharge control device performs control based on a time the movable member appears on the moving surface such that the movable member is sunk from the moving surface.

FIG.1

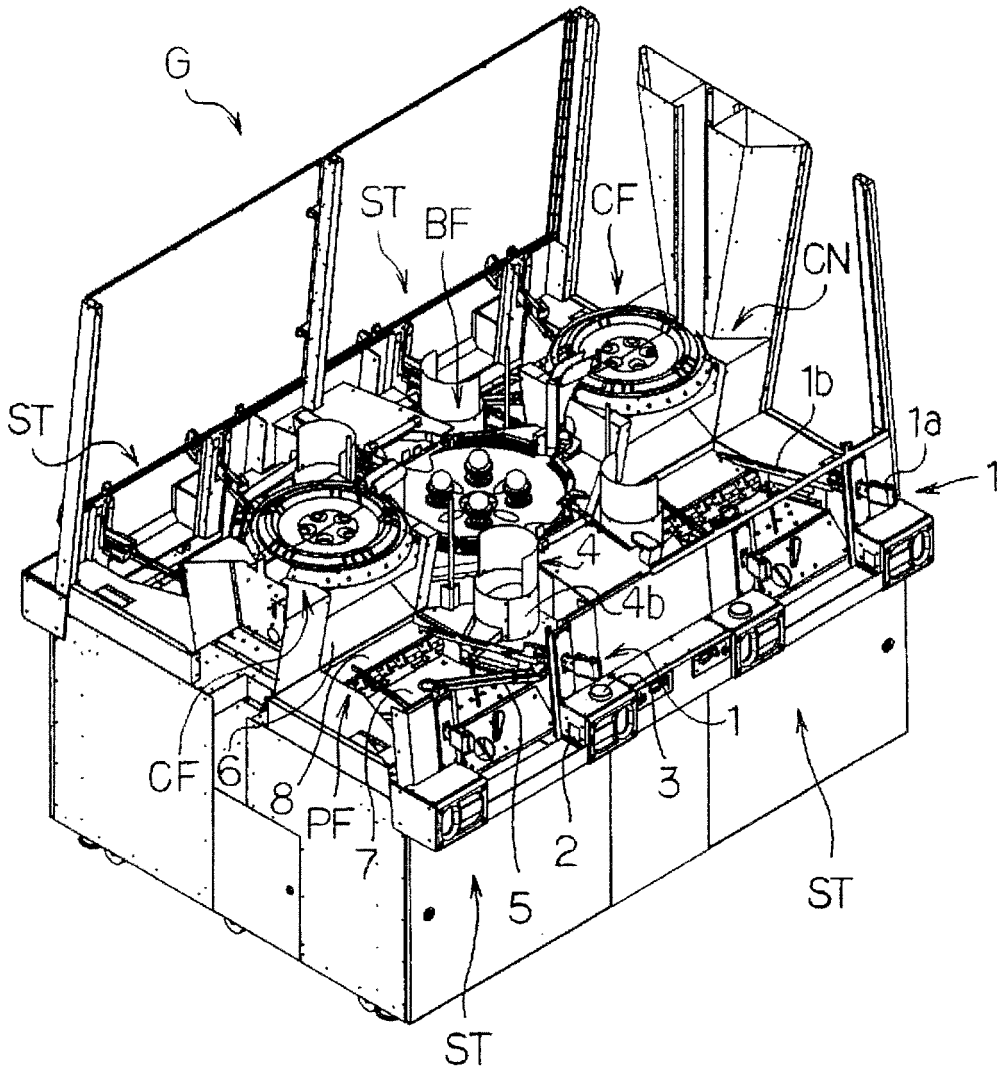


FIG.2

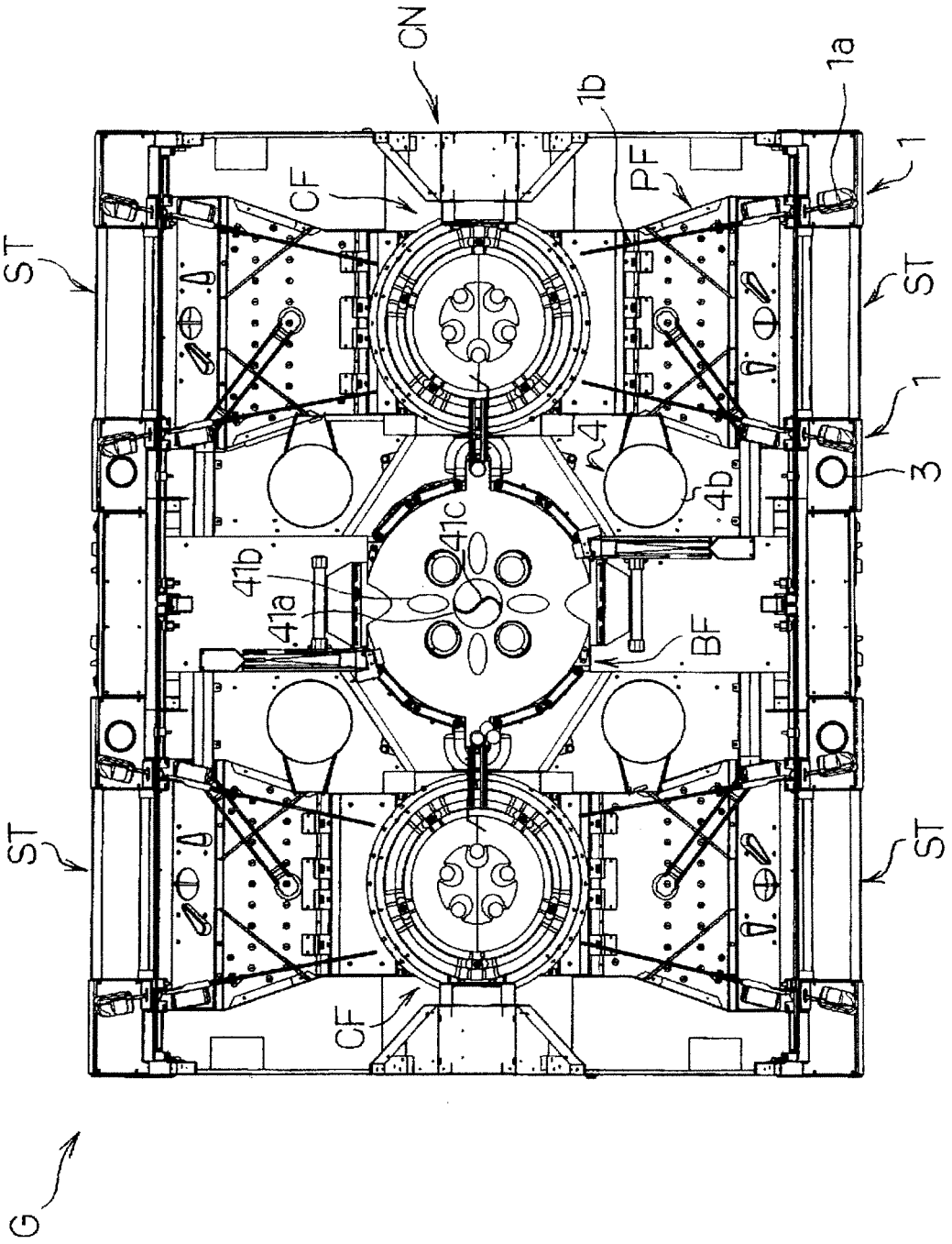


FIG.3

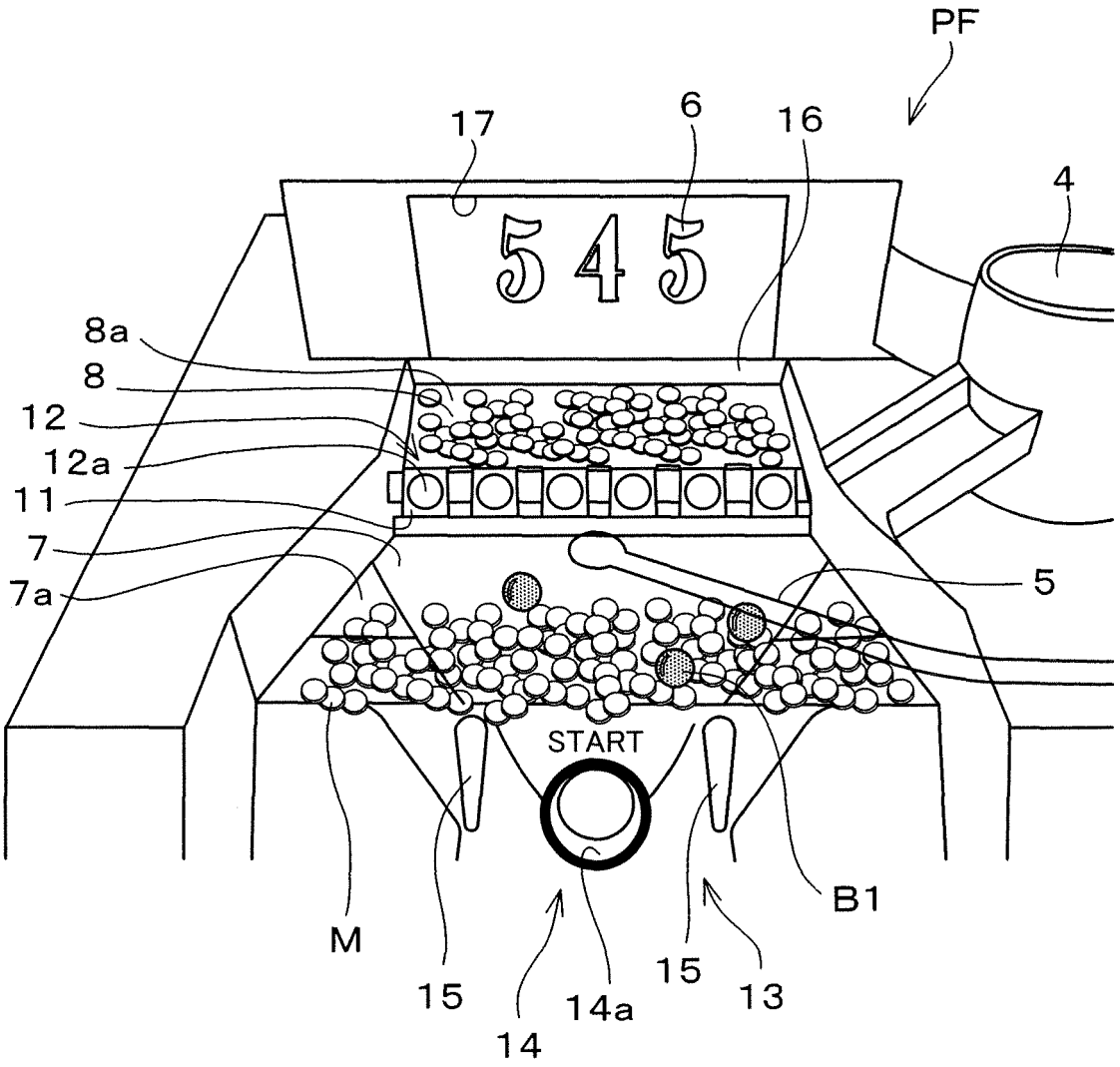


FIG.4

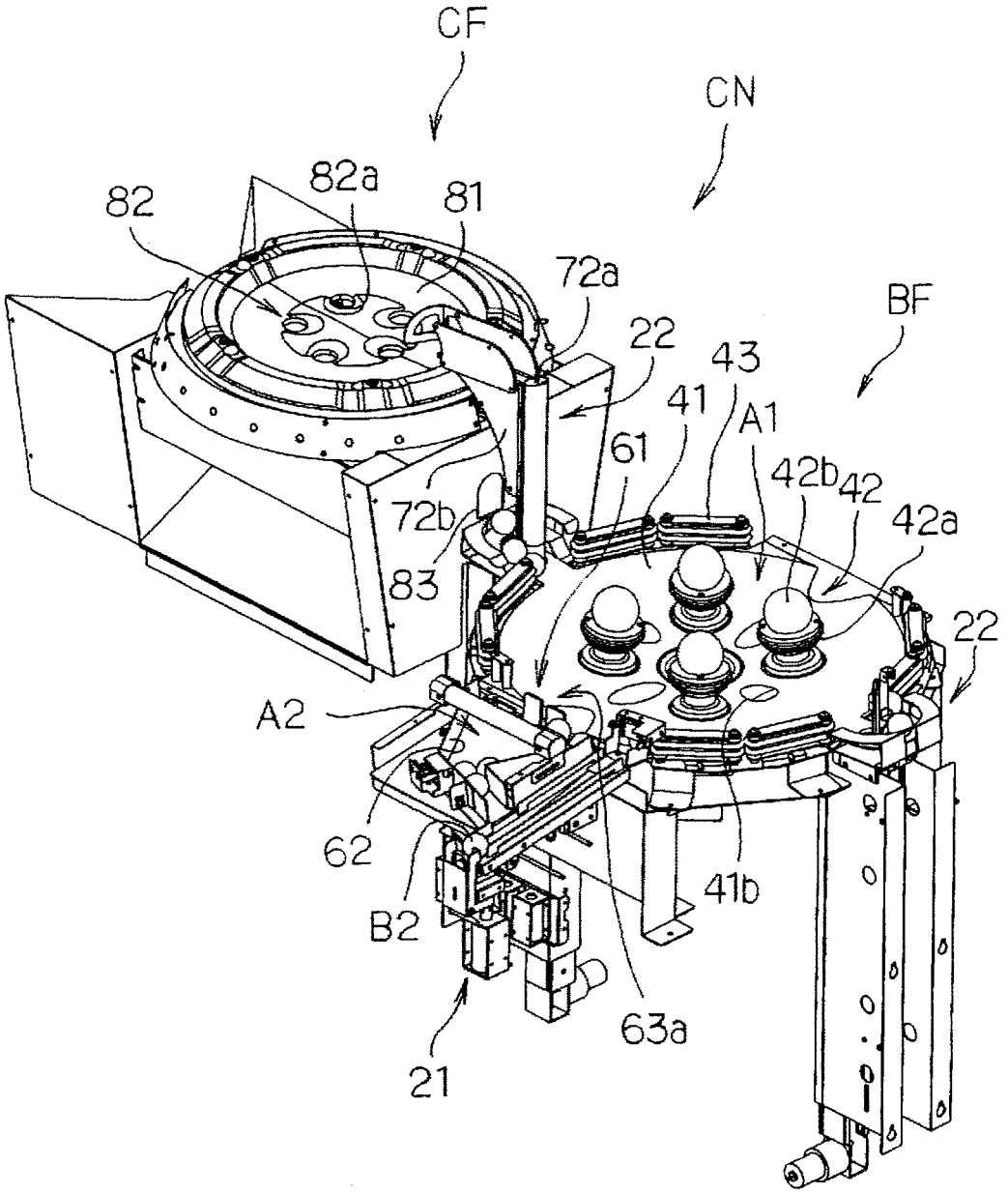

CF
CN
82
82a
81
72a
22
BF
43
41
A1
61
42b
42
42a
72b
83
22
A2
62
B2
41b
63a
21

FIG.5

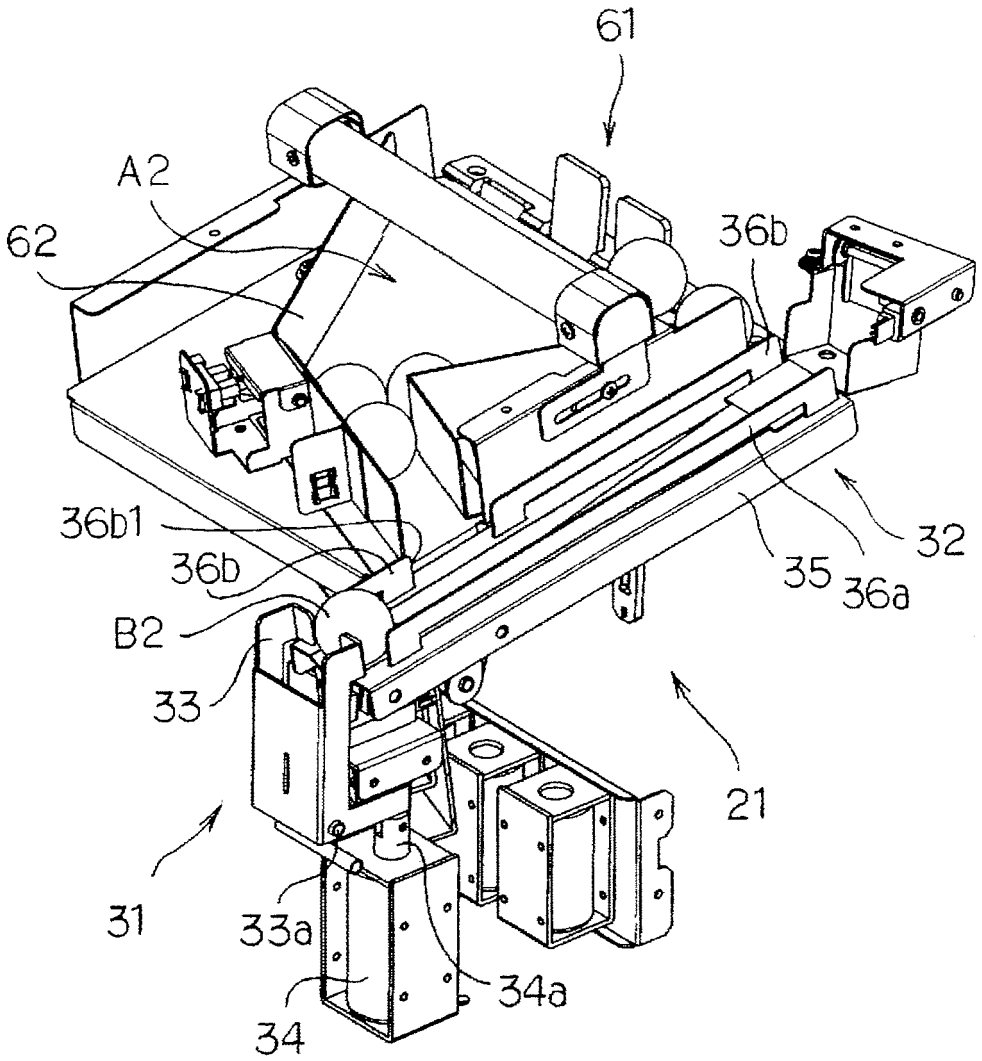


FIG.6

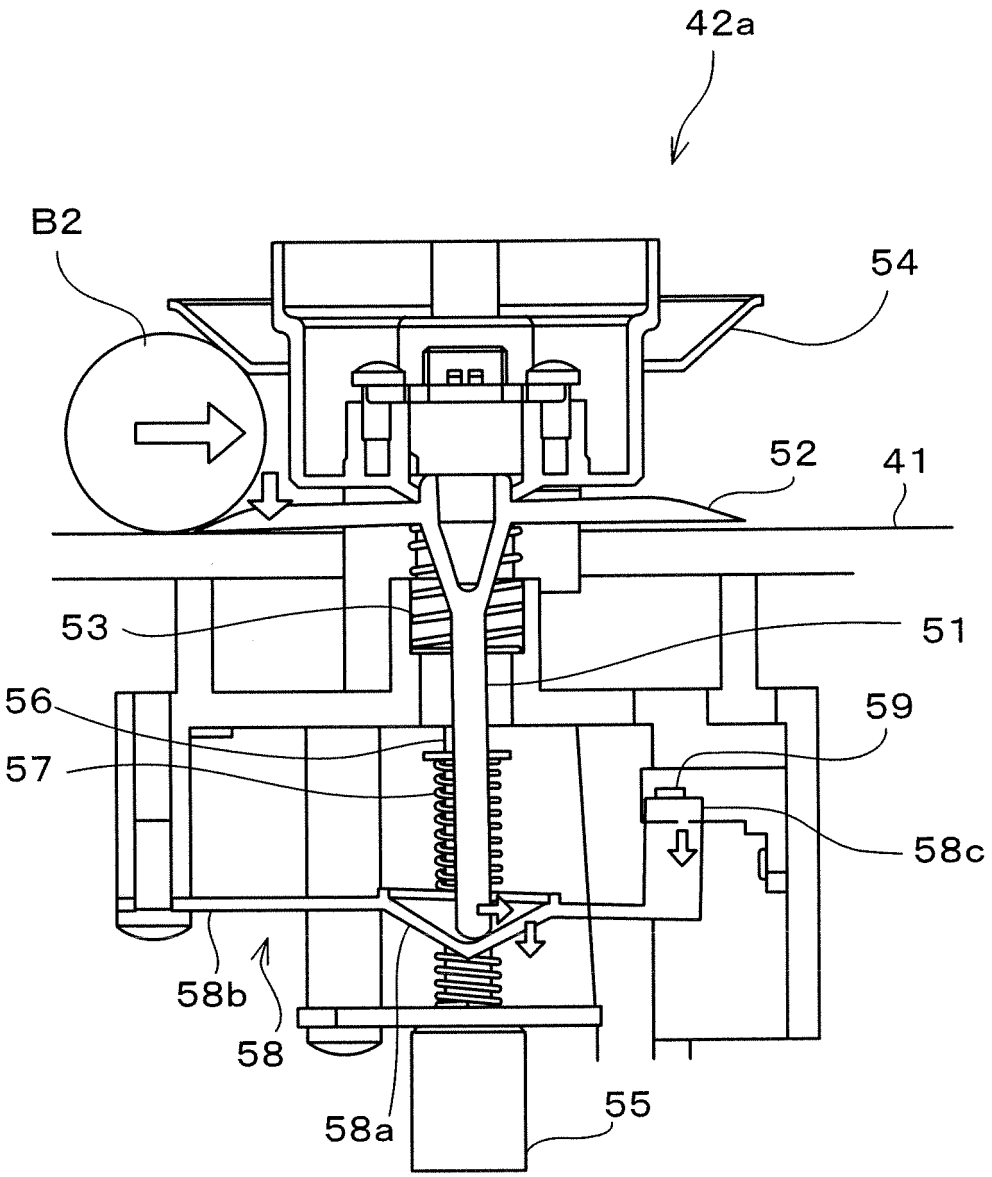


FIG.7

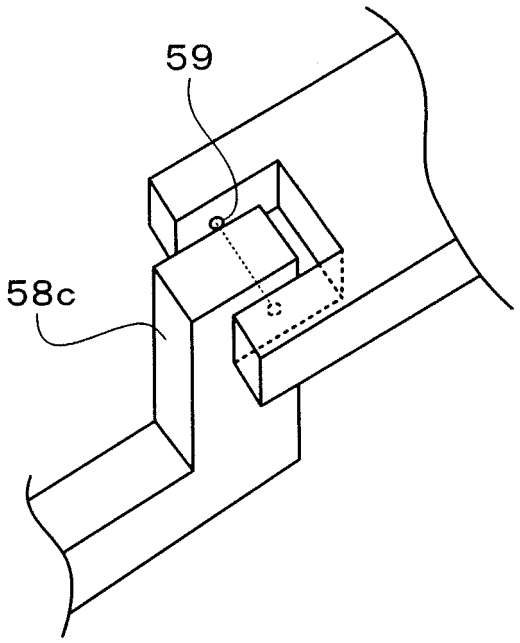


FIG.8

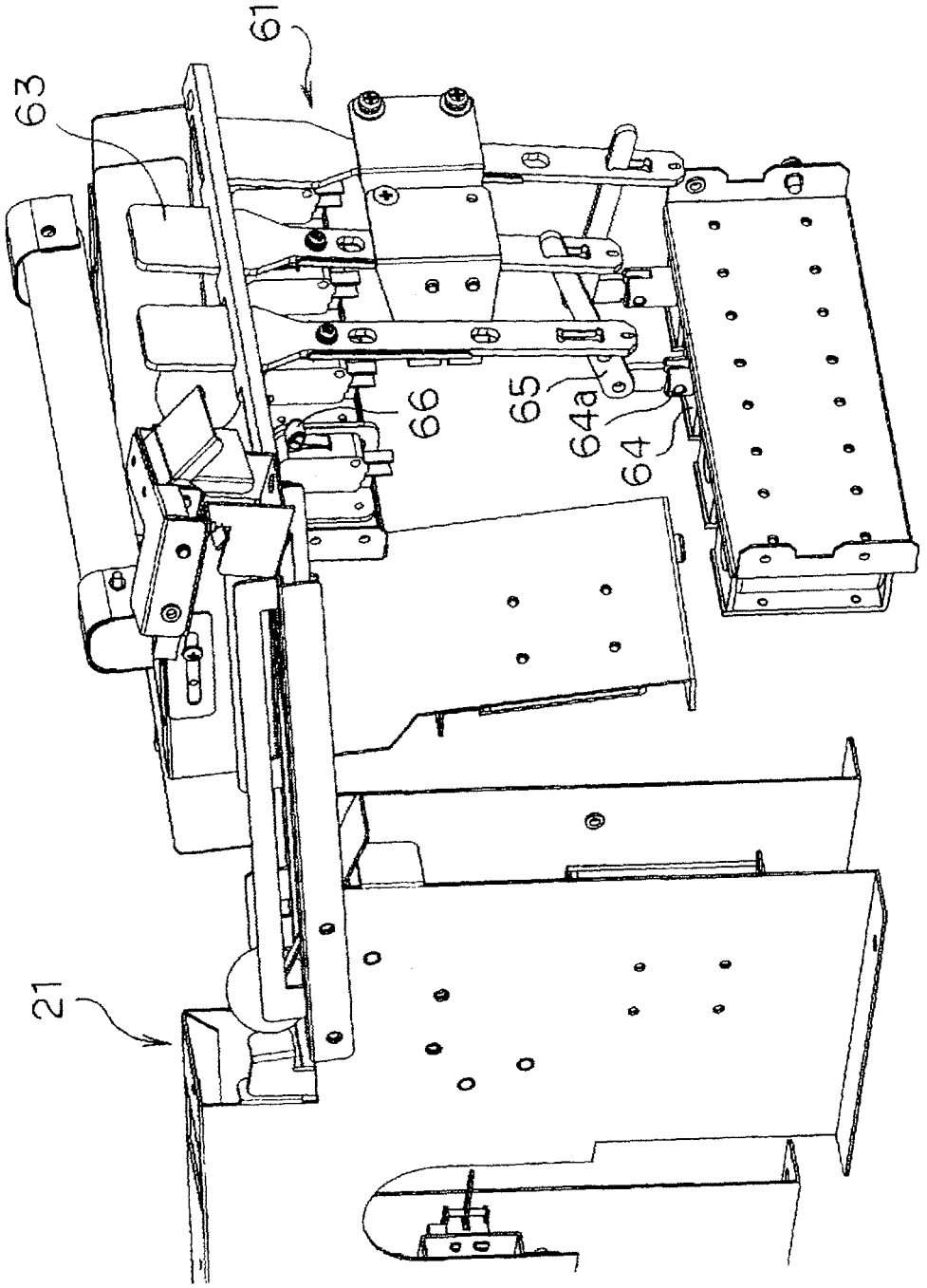


FIG.9

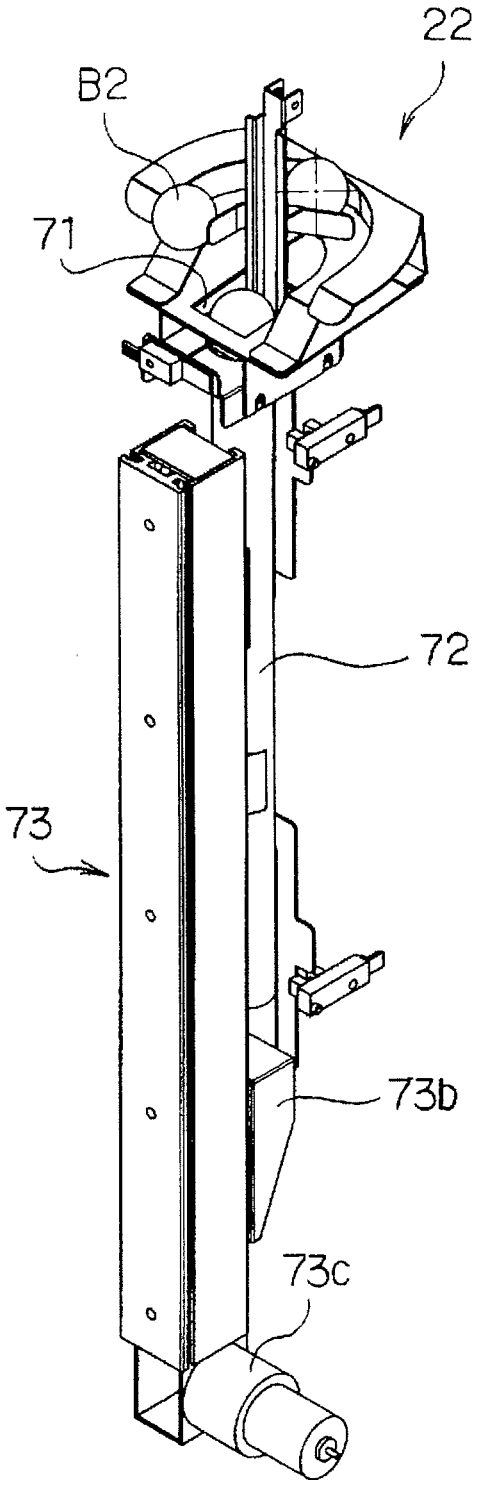


FIG.10

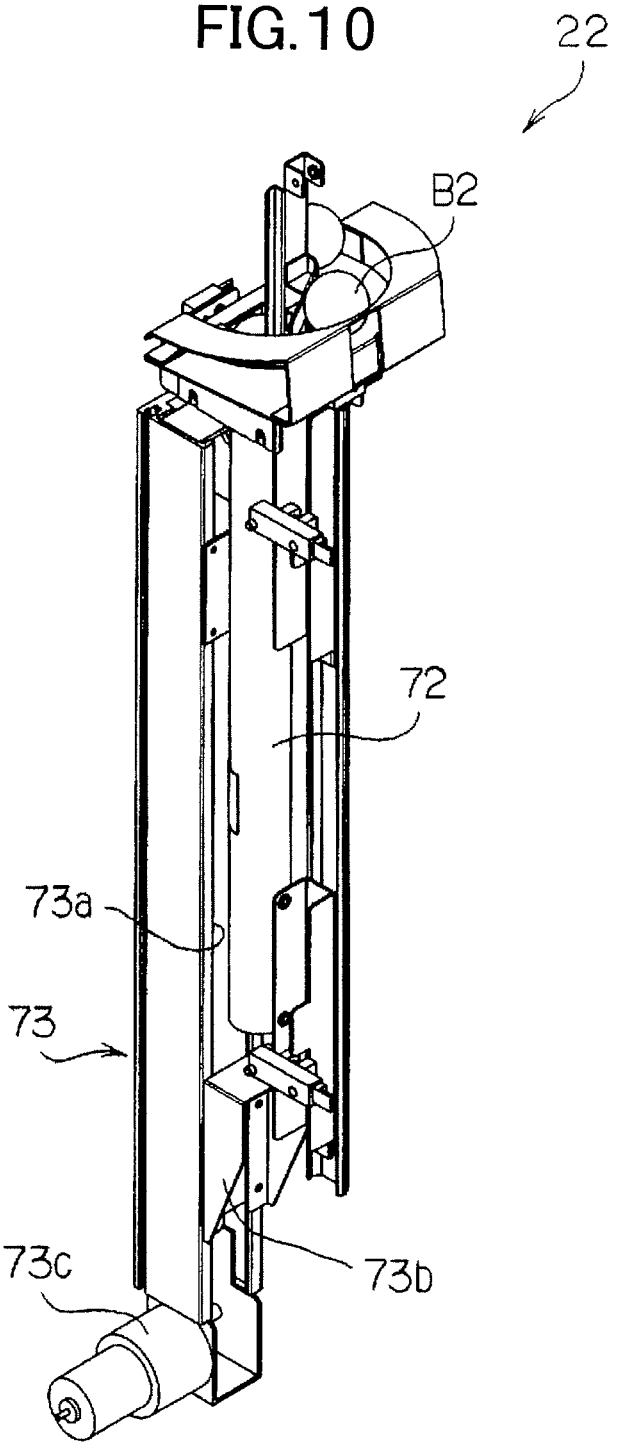


FIG.11

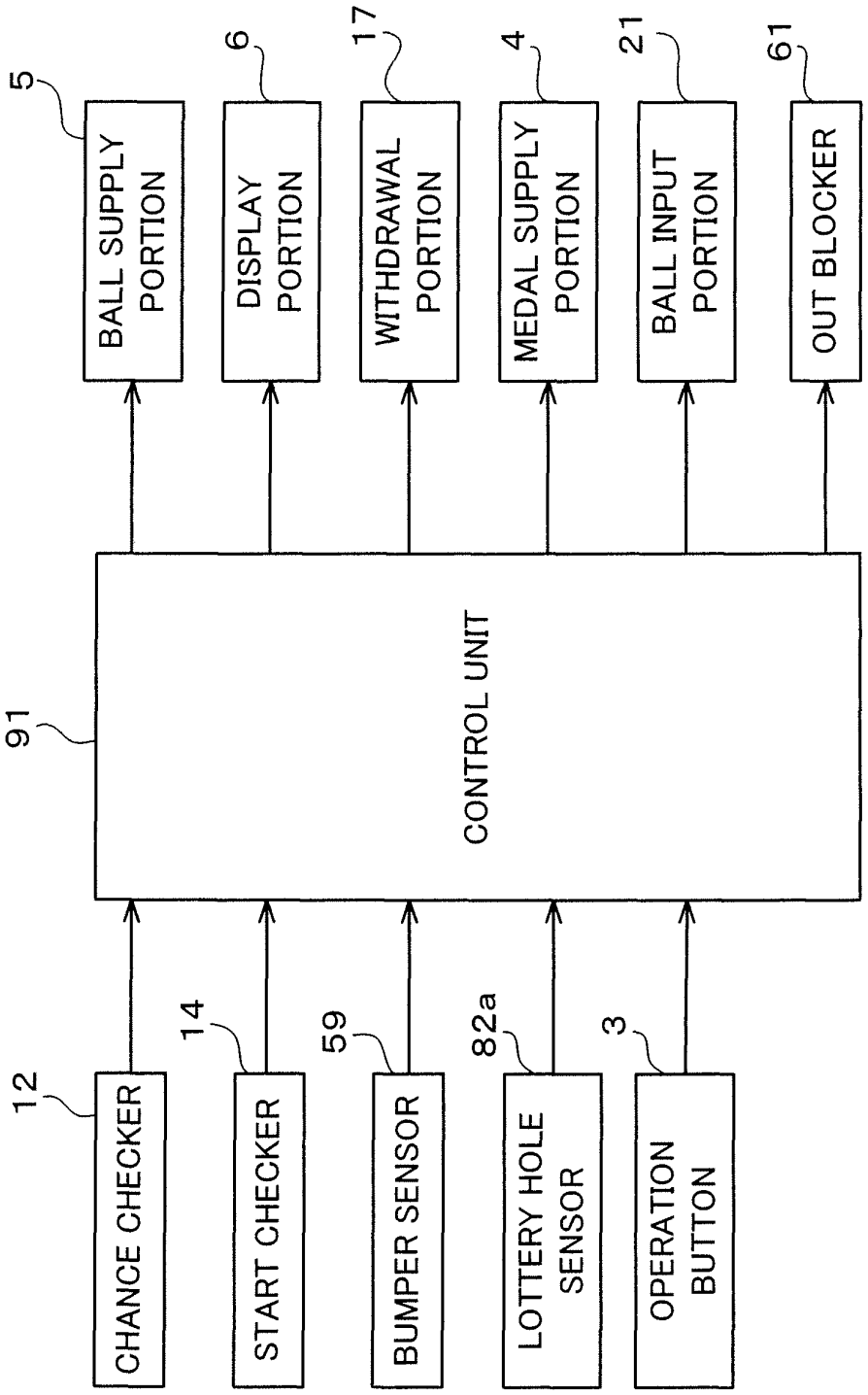

5
BALL SUPPLY PORTION
6
DISPLAY PORTION
17
WITHDRAWAL PORTION
4
MEDAL SUPPLY PORTION
21
BALL INPUT PORTION
61
OUT BLOCKER
91
CONTROL UNIT
12
CHANCE CHECKER
14
START CHECKER
59
BUMPER SENSOR
82a
LOTTERY HOLE SENSOR
3
OPERATION BUTTON

FIG.12

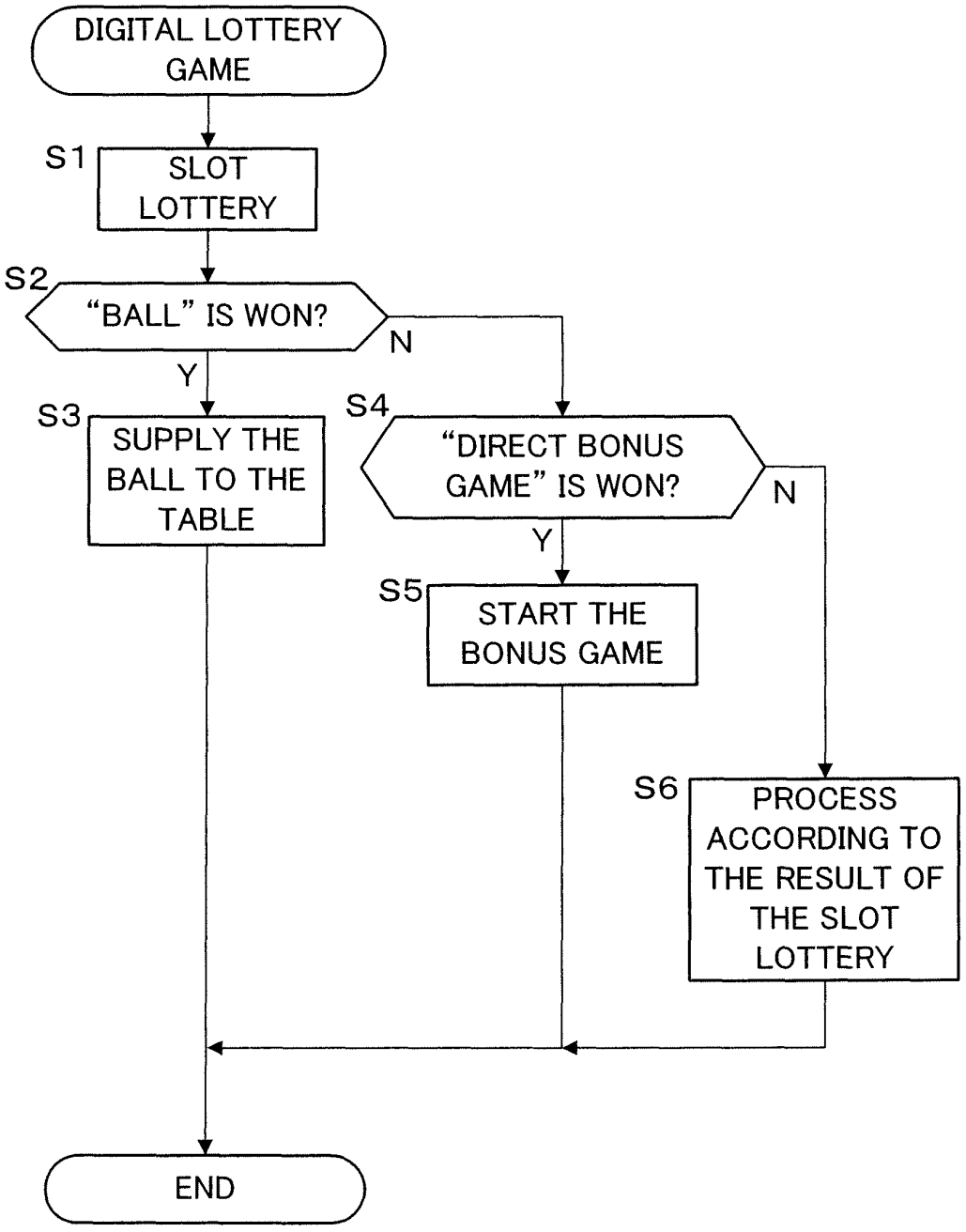

DIGITAL LOTTERY GAME
S1
SLOT LOTTERY
S2
"BALL" IS WON?
N
Y
S3
SUPPLY THE BALL TO THE TABLE
S4
"DIRECT BONUS GAME" IS WON?
N
Y
S5
START THE BONUS GAME
S6
PROCESS ACCORDING TO THE RESULT OF THE SLOT LOTTERY
END

FIG.13

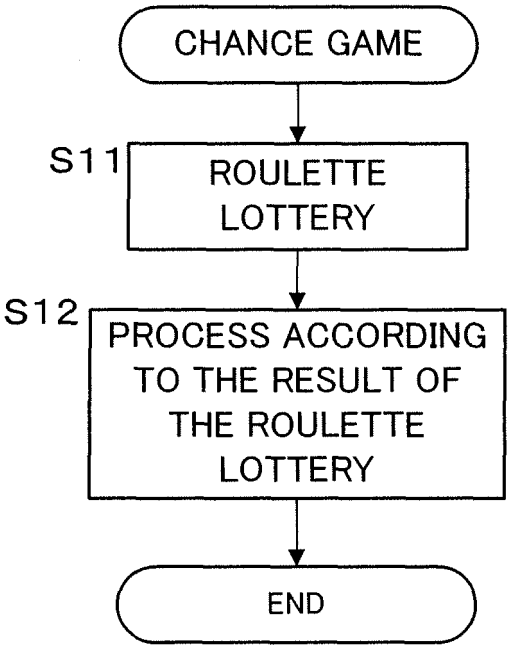

CHANCE GAME
S11
ROULETTE LOTTERY
S12
PROCESS ACCORDING TO THE RESULT OF THE ROULETTE LOTTERY
END

FIG.14

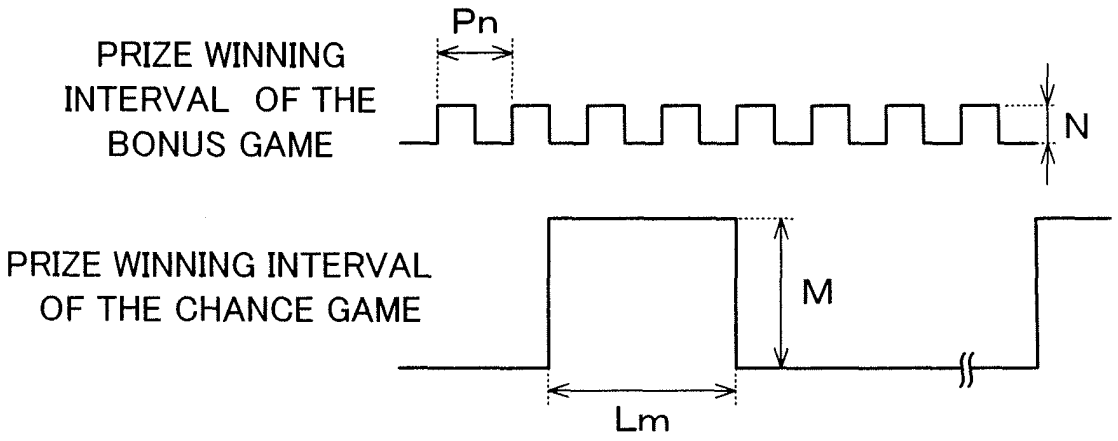
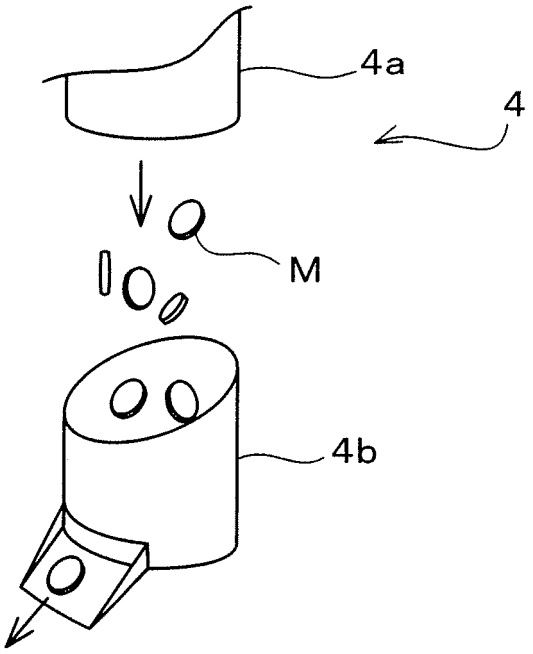

Pn
PRIZE WINNING INTERVAL OF THE BONUS GAME
N
PRIZE WINNING INTERVAL OF THE CHANCE GAME
M
Lm

FIG.15



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/051285

A. CLASSIFICATION OF SUBJECT MATTER
A63F9/00(2006.01)i

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)
A63F9/00A63F7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008
Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008

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.
X Y	JP 58-190459 A (Bally Manufacturing Corp.), 07 November, 1983 (07.11.83), Claim 1; page 3, column 9, line 5 to page 5, column 17, line 2; Figs. 1 to 3	1-3,6 4-5
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 151519/1988(Laid-open No. 71579/1990) (Sente Creations Co., Ltd.), 31 May, 1990 (31.05.90), Page 9, line 5 to page 10, line 1; Figs. 1 to 5	4-5
A	JP 2006-81768 A (Konami Co., Ltd.), 30 March, 2006 (30.03.06), Par. Nos. [0053] to [0061]; Fig. 7	1-6

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

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"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
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 February, 2008 (19.02.08)	04 March, 2008 (04.03.08)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2008/051285

JP 58-190459	1983.11.07	US 4424970 A1 GB 2115298 A DE 3304346 A FR 2521440 A BE 895918 A NL 8300572 A AU 1093583 A SE 8300771 A ES 519800 A BR 8300694 A DK 50583 A LU 84648 A IT 1164612 B IE 830312 L
JP 2-71579 U	1990.05.31	(Family: none)
JP 2006-81768 A	2006.03.30	WO 2006/030899 A1

Form PCT/ISA/210 (patent family annex) (April 2007)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2005224326 A **[0003]**