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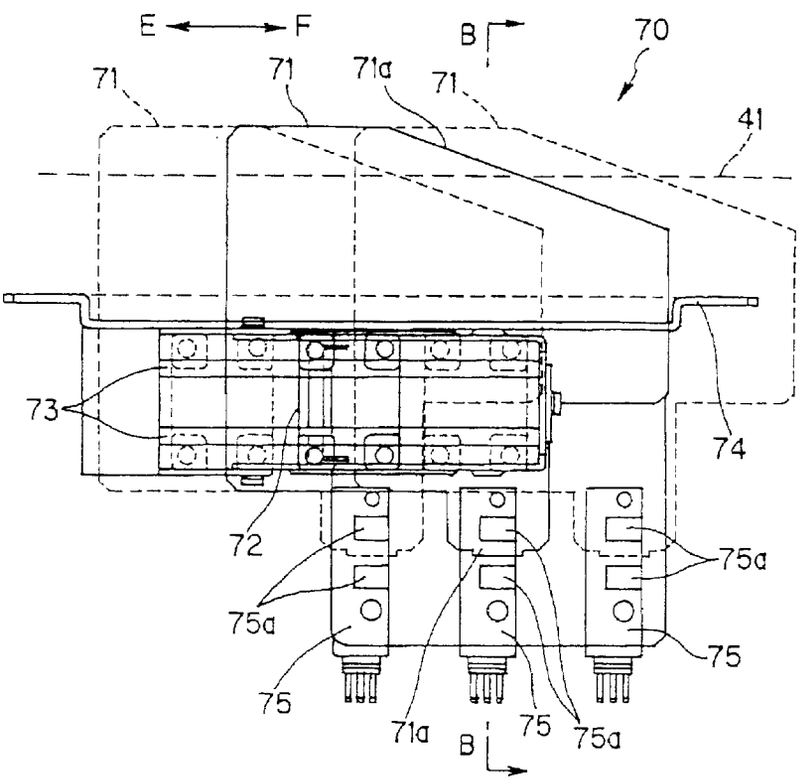
(54) Game system for playing with medals

(57) To properly manage the flow of a medal, which affects a paying-out rate, a medal game system is provided. The system supplies the medal through a field has an apparatus for controlling supply of the medal. The apparatus comprises a detecting device for detecting the flow of the medal passing the field and a adjusting device for physically adjusting the flow of the medal based on information given by the detecting device.

FIG. 9



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Description

[0001] The present invention relates to a medal game system in which medals are thrown into a field to make a game progress, more particularly, to an apparatus for controlling supply of the medals and an apparatus for supplying the medals.

[0002] There is known a game system, called pusher game system, in which a table is disposed in a field so as to move in a reciprocating fashion. Players can enjoy by making medals fall into the field utilizing the reciprocating motions of the table. In such conventional pusher game system, an apparatus for throwing in medals, which is called shoot, is used to have players throw each medal into the field. However, merely throwing in medals one by one tends to be a monotonous progress in games. In addition, the conventional pusher game system is short of a factor that attracts player's attention through visualization.

[0003] Moreover, in game system that provide games which players play by throwing medals into a field, it is required to properly control a payment rate matched to the number of thrown medals, that is, a paying-out rate. Conventionally, the paying-out rate is, however, manually adjusted, resulting in not only bothersome adjustment work but also extremely difficult situations for obtaining accurate paying-out rates. Thus, such adjustment needs operator to be skilled. Properly setting the paying-out rates is a factor that have a large influence on sales of games and game characteristics (enjoyment for games) in making games progress. Therefore, it is strongly desired that paying-out rates appropriate for games can be set easily.

[0004] The present invention has been made in consideration with the above problems.

[0005] An object of the present invention is to provide an apparatus for controlling supply of medals, which is able to not only diversify the progress of a game but also manage the flows of medals that affect the paying-out rate and others.

[0006] In order to achieve the object, the present invention is configured as follows. In the following components, references adopted from the accompanying drawings are added with parentheses, but the components of the present invention are not necessarily limited to such adoption.

[0007] To achieve the object, according to an example of the present invention, there is provided a medal game system that supplies a medal through a field (3) has an apparatus for controlling supply of the medal, characterized in that: the apparatus comprises a detecting device (45, 82, and others) which detects a flow of the medal passing the field (3); and an adjusting device (71 and others) for physically adjusting the flow of the medal based on information given by the detecting device (45, 82, and others).

[0008] In the above example, the apparatus comprises the adjusting device (45, 82, and others) for detecting a flow of the medal passing the field (3) and the adjusting device (71 and others) for physically adjusting the flow of the medal based on information given by the detecting device (45, 82, and others). Therefore, without cumbersome work, the flow of the medal can be controlled appropriately.

[0009] The adjusting device (71 and others) may adjust a paying-out rate of the medal paid from the medal game system.

[0010] In this case, because the adjusting device (71 and others) adjusts a paying-out rate of the medal paid from the medal game system, the paying-out rate can be set adequately, without a difficult operation.

[0011] The medal may spread into a first branch flow for paying the medal to a player and a second branch flow for recovering the medal and the adjusting device (71 and others) may adjust a flow ratio of the medal between the first and second branch flows.

[0012] In this case, because the flow of the medal spreads into a first branch flow for paying the medal to a player and a second branch flow for recovering the medal and the adjusting device (71 and others) adjusts a flow ratio of the medal between the first and second branch flows, the paying-out rate can be set adequately, without a difficult operation.

[0013] The adjusting device (71 and others) may be constructed to adjust a width of a passageway though which the medal passes.

[0014] In this case, because the adjusting device (71 and others) is constructed to adjust a width of a passageway though which the medal pass, a medal flow can be controlled in a steady manner.

[0015] The adjusting device (71 and others) may consist of a member movably arranged so as to interfere movement of the medal.

[0016] In this case, because the adjusting device (71 and others) consist of a member movably arranged so as to interfere movement of the medal, a medal flow can be controlled in a steady manner.

[0017] The adjusting device (71 and others) may consist of a member for changing a slope of a passageway through which the medal flow.

[0018] In this case, because the adjusting device (71 and others) consists of a member for changing a slope of a passageway through which the medal flow, a medal flow can be controlled in a steady manner.

[0019] The medal game system may have a game system body comprising a moving member (42) reciprocating-moved within the field (3) and a construction in which at least part of the medals that are made to fall from the field (3) are paid to a player utilizing a reciprocating motion of the moving member.

[0020] The remaining features of the invention will be clearly understood from the following description of preferred embodiments and their modifications, described together with accompanying drawings.

[0021] In the accompanying drawings:

Fig.1 is an outer perspective view of a pusher game system according to the present invention;
Fig.2 is the plan view of the pusher game system;
Fig.3 is an illustration explaining the sections of a field;
Fig.4 is the plan view of the field;
Fig.5 is a sectional view taken along a line V-V in Fig.4;
Fig.6 is a plan view of a checker;
Fig.7 is a sectional view taken along a line VII-VII in Fig.6;
Fig.8 shows the constructions of a fixed table and a moving table;
Fig.9 is the plan view of a paying-out rate adjusting mechanism;
Fig.10 is a cross section view taken along a line X-X in Fig.9;
Fig.11 pictorially shows a recovery mechanism of medals;
Fig.12 is an illustration indicative of the entire location of the medal recovery mechanism;
Fig.13 represents a spare hopper;
Fig.14 is a view showing the spare hopper along a direction XIV in Fig.13;
Fig.15 is a view showing a main hopper;
Fig.16 is a conceptual view showing an alternative example of a medal supply mechanism employing the main hopper;
Figs.17 and 18 are block diagrams representing the control system of the present pusher game system;
Fig.19 is a flowchart showing processing for counting the number of checker hits;
Fig.20 is part of a flowchart showing processing for setting the numbers of checkers and others.
Fig.21 is a partial flowchart continued from Fig.20;
Fig.22 is a partial flowchart continued from Fig.21;
Fig.23 is a flowchart illustrating switch-determining processing;
Fig.24 is a flowchart showing processing for spouting medals;
Fig.25 is a flowchart indicative of processing for controlling a paying-out rate; and
Fig.26 shows one variation in which an adjustment plate can be moved in the longitudinal direction.

[0022] Referring to the accompanying drawings, embodiments of the present invention will now be described.

[0023] Referring to Figs.1 to 26, one example of a medal supply apparatus according to a game system of the present invention will be described. In this embodiment, the game system is practiced into a pusher game system, as one example.

[0024] As shown in Figs.1 and 2, the game system has an approximately cylindrical base 1, an approximately hemisphere-like clear cover 2 attached on the base 1, and a field 3 which positions inside the clear cover 2 and presents a place into which medals are thrown for making a game progress. To the apex of the clear cover 2, a display board P displaying the name of the game and others are attached.

[0025] When viewing the base 1 from the topside, the base 1 is equally sectioned into six radial regions, using as boundaries the positions of pillars 21 supporting the clear cover 21. The sections are used as stations ST1 to ST6 where players operate for making a game progress. That is, the game system is constructed so that a maximum of twelve players can enjoy individual independent games at a time.

[0026] In each of the station ST1 to ST6, provided are a pan 11 to which medals are paid depending on the progress of a game, a plate 12 on which how to play is written, two shoots 13 used by players to throw medals toward the field 3. When a medal is vertically put in a medal throw hole 13a of each of the shoots 13, the medal rolls and falls on and along the shoot 13 by self-weight to be thrown in the field 3. Each shoot 13 is attached so that it can be rotated in both the right and left directions when viewing from a player. So a player first moves the shoot 13 in a desired direction, then put a medal in the medal throw hole 13a, the medal rolling and falling into the field 3. The player can enjoy the game. In the shoots 13 is provided a medal throw sensor 13b (refer to Fig. 18) for counting thrown medals one by one.

[0027] Fig.3 is an illustration drawn by extracting only the regional sections of the field 3 from the entire construction. As shown in Fig.3, a circular common region CA is arranged in the central portion of the field 3. The common region CA is used commonly by players who stand in front of the stations ST1 to ST6 in playing each game. Six fan-shaped sections SC1 to SC6 are arranged around the common area CA in a manner that they surround the area CA, which are sectioned using boundaries defined by the positions of the pillars 21 of the clear cover 2. The sections SC1 to SC6 are dedicated area used by players who stand in front of the corresponding stations ST1 to ST6 in order to perform games.

[0028] As shown in Fig.4, in the common area CA, a rotary table 31 is provided so as to be rotatable around a rotary axis formed by a center axis X of the base 1 (refer to Fig.3). A cap 32 is arranged in a central portion of the rotary table 31 in the state that the cap is secured to the game system body side. A circular opening 32a is formed at the center of the cap 32 (refer to Fig.1). The opening 32a is formed for passing large quantities of medals to be spouted, like a fountain, above the rotary table 31. The spouted medals fall onto the rotary table 31 to be temporarily stored thereon, then are paid toward each section SC1 (to SC6). A mechanism for spouting medals will be described later.

[0029] The foregoing rotary table 31 is formed such that the entire table rotates as one unit, but an alternative rotary table may be such that it is divided into a plurality of concentric tables each of which rotate differently, presenting visually complex motional expressions.

[0030] On one hand, as shown in Figs.4, 5 and 8, in each of the sections SC1 to SC6, there are a fixed plate 41 fixedly attached against the base 1 and a fan-shaped moving plate 42 attached rotationally in the both directions about the center axis X of the game system; the upper surfaces of those plates are lowered in height than that of the rotary table 31. The moving plate 42 is driven by a table drive motor 207 (refer to Fig.17) to reciprocatingly and rotationally move along a direction AB as shown in Figs.4 and 5, so that the plate repeatedly moves between two positions shown by reference 42' and 42" in Fig.5. Protrusions 42a are each formed at both moving-directional ends of the moving plate 42. This configuration allows the number of medals that fall onto the fixed plates 41 is restricted, so that some of the medals can be stored on the moving plate 42 for a moment.

[0031] The shoots 13 arranged in each station are set in their rotation angles in a manner such that one shoot is able to throw in medals toward the fixed plate 41, while the other one toward the moving plate 42. A player can select either one shoot 13 in playing a game, allowing the player to throw in medals onto the fixed plate 41 or the moving plate 42 at her or his will.

[0032] As represented in Fig.5 (corresponding to a V-V line section in Fig.4), both the fixed plate 41 and the moving plate 42 are used in common between the section SC1 and the section SC2. Thus, the rotation of the moving plate 42 in the A-direction is transformed into its motions which, in the section SC1, causes medals on the fixed plate 41 to be pushed out in the section 1 as well as which, in the section SC2, causes the moving plate to be released from medals on the fixed plate 41. When the moving plate 42 rotates in the B-direction, the above motional relationship is reversed. On the boundary line between the sections SC1 and SC2, a medal separator 43 is disposed to prevent medals from being mixed with the contiguous ones. Thus, medals once laid on the moving plate 42 are never be put into the contiguous section during its movement.

[0033] Although Fig.5 shows only the boundary region between the sections SC1 and SC2, that between the sections SC3 and SC4 and that between the sections SC5 and SC6 are configured in the same way. Therefore, the game system has not only line symmetric configurations between the sections SC1 and SC2, the sections SC3 and SC4, and the sections SC5 and SC6, respectively, with respect to a boundary line in each pair of sections, but also a rotation symmetry arrangement of the three blocks each containing two sections.

[0034] During the progress of a game, medals are always stored on both the fixed plate 41 and the moving plate 42. Hence, when a further supply of medals is done, the reciprocating movement of the moving plate 42 causes medals on the moving plate 42 to be pushed out with the help of the medal separator 43 as well as medals on the fixed plate 41 to be pushed out with the edge of the moving plate 42. The medals are, therefore, gradually moved from the moving plate 42 to the fixed plate 41, and finally fallen from the fixed plate 41.

[0035] Between the foregoing rotary table 31 and each of the sections SC1 to SC6, a not-shown gate is placed for supplying medals selectively from the rotary table 31 to each section SC1 (to SC6). This gate is placed one by one between the rotary table 31 and each section SC1 (to SC6), and each gate is constructed so that its open and close operations are independent from the other ones.

[0036] Any gate construction is available. For example, a gate that can be sunk under the surface enables medals to pass over the gate, or a gate that can be slid in the lateral direction also produce an exit to pass medals. Alternatively, a gate may be pulled up above the surface of the rotary table 31. Still an alternative gate can be realized with its rotary operation to form an opening.

[0037] In the state that lots of quantities of medals (for example, approx. 100 pieces) are spouted and put on the rotary table 31, the rotary table 31 is rotationally driven and one or more specified ones of the gates are opened. The rotated rotary table 31 produces the centrifugal force that allows the medals on the rotary table 31 to flow into one or more corresponding sections through the opened one or more gates. Adjusting the positions of the gates can set locations to which medals are thrown. For example, installing a gate to a position nearer to the moving plate 42, medals that have been on the rotary table 31 can be supplied on the moving plate 42. If a bunch of medals are supplied on the fixed plate 41 at a time, the medals will fall down immediately from the fixed plate 41. Therefore, it is preferred that medals be supplied toward the moving plate 42, provided raised game characteristics are desired.

[0038] A segment type of display apparatus 51 shown in Figs.1, 2 and 4 is a device that displays, as three digits of figures, the result of a lot carried out when a later-described "checker hit" occurs. Such figure represented by each digit is displayed using seven segments. Immediately before the result of a lot is displayed, the seven segments composing each digit are turned on and off separately, showing that the lot is in progress. If all the three digits show the same figures when the segment type of display apparatus 51a displays the result of a lot, the result means a "hit." If only any two of the three digits show the same figures, the result is a "check." When the lot result does not correspond to both ones, the result becomes a "missed." An "odd hit" or "even hid" is gained, provided all the three figures that are the same odd numbers or even numbers, respectively. The progress of a game depends on whether the result is an "odd hit" or "even hid".

[0039] The segment type of display apparatus 51 has green and red illuminating elements that illuminate green and red colors, and also illuminates a color of orange by turning on both types of illuminating elements. An illuminating-diode type of display apparatus 52, which is disposed side by side with the segment type of

display apparatus 51, is used for displaying the number of times of "check" by the number of tuned-on illuminating diodes, up to a maximum of eight diodes. The illuminating-diode type of display apparatus 52 has seven green illuminating elements and one orange illuminating element, so that the red one finally illuminates when the "check" has been accumulated eight times.

[0040] Medals that fallen down via the edge 41a of the fixed plate 41 (Figs.2 and 4) then fall from a medal fall hole 201 (refer to Fig.2) to a medal shoot not shown. Then the medals slidably fall along this medal shoot down to a pan 11 shown in Fig.1, being paid back to a player. In order to count the number of medals passing through this medal shoot, a medal count sensor 45 is installed in the middle thereof (refer to Fig.18). A player can gain more medals by trying to make more medals fall from the edge 41a of the fixed plate 41.

[0041] A checker 60 shown in Fig.6 is disposed to selectively detect only medals that falls from a given position of the edge 41a of the fixed plate 41. When the checker 60 detects the fall of one or more medals, a state called "checker hit" is obtained. In response to this checker hit, a lot is carried out, then a result of the lot is displayed by the segment type of display apparatus 51.

[0042] The checker 60 is composed of three detectors 61A to 61C and a fixing member 62 that fixes the three detectors 61A to 61C to the fixed plate 41 (refer to Fig. 7) at intervals. As shown in Figs.6 and 7, the detector 61A comprises a detecting piece 63A attached rotationably in a CD-direction (refer to Fig.7), a shielding member 64 secured to the detecting piece 63A, a photointerrupter 65 detecting a rotational position of the detecting piece 63A, and a case 66 containing the photointerrupter 65. The detectors 61B and 61C are configured in the same manner as that of the detector 61A.

[0043] As shown in Fig.8, the checker 60 is fastened so that the detecting pieces 63A to 63C protrude from the edge 41a of the fixed plate 41 in the lateral direction. And in a normal state, the detectors 63A to 63C keep a rotated position in the D-direction in Fig.7, owing to their weight balances. In the case that medals that fallen in the medal fall hole 201 from the edge 41a of the fixed plate 41 fall onto the detecting pieces 63A to 63C, the balance of the detecting pieces 63A to 63C will be lost due to their self-weights to rotate in a C-direction. This rotation causes the shielding member 64 to shield a light path of the photointerrupter 65, detecting the fall of the medals.

[0044] Both the detecting piece 63A of the detector 61A and the detecting piece 63C of the detector 61C are each composed of semitransparent member colored in green, whilst the detecting piece 63B of the detector 61B is that colored in orange. Each of the detectors 61A to 61C has a case 66 to which a performance lamp 67 is attached. As described later, the number of detectors, that is, the number of detectors 61A to 61C that allow operations for proceeding to a lot procedure to be performed is varied according to a hit state gained at each moment. The display colors of the segment type of display apparatus 51 at each moment and the available colors of the detecting pieces 63A to 63C of the detectors 61A to 61C are made correspondent to each other. In detail, in cases where only the detector 61B is available, the segment type of display apparatus 51 displays in green. Where the detectors 61A to 61C are all available, the segment type of display apparatus 51 displays in orange. When a medal passes any of the detecting pieces 63A to 63C and its fall is detected, the performance lamp for the detector is lit for a given time, and the detecting piece that detected the medal fall is made bright in its color. This brightness shows a player a checker hit.

[0045] In addition to medals falling without contact with any detecting piece, medals which impinged onto any of the detecting pieces 63A to 63C then slidably fall along the not-shown medal shoot to be guided to the pan 11 shown in Fig.1, and paid back to a player.

[0046] As stated above, waiting positions are determined depending on the self-weights of the detecting pieces 63A to 63C and a non-contact detection is made using the photointerrupters 65. Therefore, there are no drawbacks, such as failures in the detection due to the detecting pieces 63A to 63C that stop at un-planned attitudes or unstable detection because of failures in electrical contact. Additionally, it is not required to install restoring energization means including springs, and/or, drive mechanisms for returning the rotated positions.

[0047] A paying-out rate adjusting mechanism 70 shown in Figs.9 and 10 is arranged for controlling medals falling over and from an end 41b of each fixed plate 41 (refer to Fig.8), the end being nearer to the center of the game system.

[0048] In general, such construction in which medals fall from a place of the fixed plate 41 other than the normal medal fall hole set thereto and those medals are not paid to a player is called "recovering mechanism." This mechanism is placed to adjust an entire paying-out rate over the pusher game system. In the recovering mechanism, part of medals on the fixed plate 41 is made to fall into a medal supply mechanism (i.e., a spare hopper 110) in the pusher game system, as will be described later, such that players are not conscious of it as possible as it could. The conventional parent-dropped mechanism was made up of, for example, a fixed type of slit, of which slit width was adjustable by hand. But such manual adjustment required a lot of time and it was extremely difficult to set the paying-out rate in an accurate manner. The paying-out rate adjusting mechanism 70 of this embodiment solves such problems.

[0049] As shown in Figs.9 and 10, the paying-out rate adjusting mechanism 70 has an adjustment plate 71 movably placed closely to the end 41b so as to interfere the fall of medals, a linear motor 72 linearly driving the adjustment plate 71 along the end 41b, a rail 73 guiding a moving element of the linear motor 72, an attachment 74 securing the rail 73 to the fixed plate 41, and three

photointerrupters (refer to Fig.9) detecting the positions of the adjustment plate 71.

[0050] As illustrated in Fig.9, the adjustment plate 71 is attached so that part thereof protrudes upward in height than the surface of the fixed plate 41 and driven in a EF-direction by the linear motor 72 (refer to Figs.8 and 9). As shown in Figs.9 and 10, a detection claw 71b is formed by folding the lower end of the adjustment plate 71. By controlling and stopping the linear motor 72 at a position where the detection claw 71b intercepts any photointerrupter 75, the positions of the adjustment plate 71 can be changed through three stages.

[0051] As represented in Fig.9, the adjustment plate 71 includes a inclined portion 71a formed by cutting obliquely. So moving the adjustment plate 71 in an EF-direction permits it to move, concurrently with a range of the adjustment plate 71 that protrudes upward than the end 41b of the fixed plate 41. Although not shown in Fig. 9, in the left side (the side of the E-direction) of the left end of the adjustment plate 71, a wall is formed to prevent the medals from falling from the end 41b. As a result, medals can fall from only an opening formed in the wall. That is, in Fig.9, medals are made to fall from only a range formed at the right side of the protruded portion of the adjustment plate 71. Hence, as the adjustment plate 71 is moved along the E-direction, a range in which no protrusion thereof exists is widened, thereby it will getting easier that medals fall through the widened range. Selecting positions of the adjustment plate 71 in the EF-direction makes it possible to adjust a rate at which medals fall from the end 41b through three stages.

[0052] As represented by Fig.8, another adjustment plate 76 is arranged movably in a GH-direction at a position close to an outer-circumferential end 41c of the fixed plate 41. This adjustment plate 76 is formed in a similar shape to the foregoing plate 71. Like the adjustment plate 71, selecting a position of the adjustment plate 76 in the GH-direction allows a rate at which medals fall from the end 41c to be adjusted. The adjustment plate 76 is driven by a linear motor 77 (refer to Fig.18), its position is detected by a photointerrupter 78 (refer to Fig.18). In terms of functions, the linear motor 77 is similar to the foregoing linear motor 72 and the photointerrupter 78 is so to the foregoing photointerrupter 75.

[0053] The medals to be fallen from the fixed plate 41 always pass any one of its ends 41a, 41b, and 41c. There is no other falling passageway for medals. In consequence, as described above, adjusting a degree at which medals can fall from either one end 41b or 41c leads to adjustment of a ratio between the number of medals falling from one end 41a and that falling from the remaining ends 41b and 41c.

[0054] By controlling the rate at which medals fall from either one end 41b or 41c, the paying-out rate can be adjusted against the number of thrown medals. For example, lowering such rate leads to higher rates. In contrast, by raising the rate, the paying-out rate can be reduced.

[0055] As an alternative example, there is a construction in which both regions containing the vicinities of each of the ends 41b and 41c are covered by adequate members. This construction can conceal the fall of medals from the end 41b or 41c from players. Moreover, in the case that the adjustment plate is disposed nearer to the outer circumference of the game system, like the adjustment plate 76, there is the advantage that it is difficult for players to notice the presence of the covering mechanism.

[0056] In this game system, the numbers of medals that pass each of several points specified therein is obtained, a paying-out rate practiced or value relevant to the paying-out rate is calculated on the basis of the obtained numbers, and the adjustment plates 71 and 76 are moved in compliance with the calculated value. Through this control, the paying-out rate can be set to a desired value.

[0057] As shown in Figs.26A to 26C, an alternative example is that an adjustment plate 171 is disposed movably in the longitudinal direction, and the width of a passageway limited by an inclined portion 171a thereof is altered. The Figs.26A to 26C show states in which the adjustment plate 171 is lowered little by little. The lower the adjustment plate 171 is in height position, the wider the passageway for medals is, resulting in that medals are easier to be fallen from the end 41b.

[0058] Locations where adjusting device changing flows of medals are installed are not limited to the places of the adjustment plates 71 and 76. As long as changing medal flows leads to adjustment of the paying-out rate and others, for example, the adjusting device may be installed anywhere. Additionally, though the passageway width for medals is altered to change medal flows in the above example, an alternative example is that the member interfering medal flows is arranged movably. Alternatively, changing the slope of the passageway for medals may control medal flows. Examples of the foregoing interfering member includes a protrusion attached to the fixed plate 41, which can be sunk therein, an overhang member overhanging from the end 41a of the fixed plate 41 to the side of the medal fall hole with an amount of overhang or slope adjustable, or others. Alternatively, other various adjusting device may be used, provided flows of medals can be changed.

[0059] Fig.11 pictorially shows medals Md falling from the fixed plate 41 via its end 41b or 41c. The medals that fell from the end 41b or 41c are recovered to the game system itself, without being paid to players. As shown in Fig.11, medals Md fell from the end 41b or 41c are collected toward a single exit 81a by a collector 81 arranged under the fixed plate 41. At the exit 81a is provided a medal count sensor 82 for counting the number of medals Md discharged from the collector 81.

[0060] As shown in Fig.12, to the exit 81a of each collector 81 is attached a medal shooter 83 coupled with a spare hopper 110 disposed every two stations. Medals

that fell from the end 41b or 41c of the fixed plate 41 pass the collector 81, then slidably fall along the medal shooter 83, and are recovered into any of the three spare hoppers 110.

[0061] As shown in Figs. 13 and 14, each spare hopper 110 has a container 111 capable of containing a lot of medals Md, an agitating vane 112 arranged in the bottom of the container 111, a motor 113 for the spare hopper to rotate the agitating vane 112, and an escalator 114 for aligning the medals Md hit and taken out in contact with the agitating vane 112 under rotation and guiding them upward.

[0062] As depicted in Fig.12, the medals that been carried by each escalator 114 from each container 111 are guided to a main hopper 120 disposed under the rotary table 31. As shown in Fig.15, the main hopper 120 comprises a container 121 capable of containing a lot of medals, an agitating vane 122 arranged in the bottom of the container 121, a motor 123 to rotate the agitating vane 122, an escalator 124 for aligning the medals hit and taken out in contact with the agitating vane 122 under rotation and guiding them upward, and a discharge mechanism 126 to upwardly flip medals out from an exit of the escalator 124.

[0063] The discharge mechanism 126 is made up of an urethane-made rubber roller 126a rotatably attached to an upper end of the escalator 124, a motor 126b attached in the middle of the escalator 124, a pulley 126c attached to the rotary axis of the motor 126b, and a belt 126d wound between the pulley 126c and the urethane-made rubber roller 126a. Such construction enables the urethane-made rubber roller 126a to fast rotate clockwise in Fig.15. A linear velocity at the outer circumference of the roller 126a is set to a value greater than a speed of medals arriving at the roller by the guide of the escalator 124.

[0064] A photointerrupter 127, which is arranged closely to the motor 126b, is responsible for detecting a situation that the belt 126d is cut. At a position near to an exit 124a is provided a medal count sensor 128 counting the number of medals discharged therefrom.

[0065] When medals guided by the escalator 124 arrive at the urethane-made rubber roller 126a, they contact with the roller 126a under rotation in a fast speed, causing the medals to forcefully be flipped and blown off nearly upward from the exist of the escalator 124, for example, up to a height as high as approx. 50 centimeters from the exit 124a. Owing to the fact that medals aligned by the escalator 124 arrive at the roller one after another, the medals are flipped out from the exit 124a without a rest.

[0066] As shown in Fig.4, since the exit 124a is oriented toward the opening 32a of the cap 32, a large number of medals are flipped and blown off in succession in the common area CA of the field 3, i.e., at the center of the game system. This gives players performance effects obtained as if players saw a fountain. Also, sounds that occur when medals fall onto the rotary table 31 attract people's attention around the game system.

[0067] In place of the roller serving as the discharge mechanism for flipping medals out, other appropriate mechanisms may be used.

[0068] As described above, the construction to send medals into the main hopper 120 by way of the spare hoppers 110 is advantageous in situations that flows of medals are disturbed due to mixed foreign matters or other cases happen. That is, failures, such as jammed medals, will surely occur at the spare hoppers 110, preventing the main hopper 120 from having such failures in almost cases. As shown in Fig.12, the design that the medals are desired to be blown off at the center of the game forces the main hopper 120 to be placed at the center position. On the contrary, because the spare hoppers 110 can be placed at the positions nearer to the outer circumference of the game system, they can easily be checked if a door 14 (refer to Fig.1) of each station ST1 (to ST6) is opened. Maintenance of the hoppers can be done in an extremely facilitated fashion.

[0069] When considering suppression of jammed medals in the main hopper, it is preferable to make it agree with each other mechanisms for sending medals and/or the structure of the containers placed in both the main hopper 120 and the spare hoppers 110. An alternatively configuration may also be adopted that conditions for passing medals are severely set in the spare hoppers 110 on purpose, with the result that the medals that once passed the spare hopper 110 cause no jams in the main hopper 120.

[0070] Additionally, in the above construction, arranging the spare hoppers 110 makes it possible to set a large slope of the medal shooters (herein the slope of the medal shooters 83). Thus there is no possibility that medals are jammed on the medal shooters.

[0071] Moreover, according to an amount of medals that have been accumulated in the main hopper 120, the spare hoppers 110 may be switched between its operational and non-operational states. For example, the switching may be done such that medals are sent out from the spare hoppers 110 only when such amount is less than a given amount. The control done like this can availably distribute amounts of accumulation of circulating medals between both the main hopper 120 and the spare hoppers 110, increasing an entire circulating amount of medals.

[0072] Fig.16 shows another possible alternative example, where medals are carried nearly upward by an escalator 114A arranged to a spare hopper 110A, then slidably fallen along a medal shooter 115 toward the hopper 120.

[0073] Figs.17 and 18 are block diagrams indicative of a control system of the present game system.

[0074] A main CPU 200 is coupled to six station CPUs 300 placed station by station, and the main CPU 200 and the station CPUs 300 are able to comminute to each other. In Fig.18, though the station CPU 300 corresponding to only one station is shown, the similar con-

figuration is adopted to other five stations.

[0075] As shown in Fig.17, connected to the main CPU 200 are the photointerrupter 127 detecting a situation that the belt 126d was cut, the medal count sensor 128 counting the number of medals spouted from the exit 124a of the elevator 124, a rotary table drive motor 201 rotationally driving the rotary table 31 through a drive control unit 201a, a gate drive motor 202 driving the open and close of the foregoing gate through a drive control unit 202a, the motor 113 for the spare hopper through a drive control unit 203, the motor 123 for the main hopper through a drive control unit 204, the medal discharge motor 126b via a drive control unit 205, and a moving table drive motor 207 reciprocating-driving the moving table 42 via a drive control unit 206.

[0076] Furthermore, electrically connected with the main CPU 200 are a lighting unit 208 (refer to Fig.1) for lighting in synchronism with the progress of games and a sound unit 209 for providing sounds in synchronism with the progress of games.

[0077] As shown in Fig.18, elements electrically coupled with each station CPU 300 include the detectors 61A to 61C each detecting the checker hit, a checker-hit-number counter 301 counting the number of times of the checker hit, a check-number counter 302 counting the number of times of the check, a detector-switch-determining counter 303 used for determining whether the number of available detectors 61A to 61C is switched or not, the photointerrupters 75 and 78 each detecting the position of the adjustment plates 71 and 76, the medal throw sensors 13b detecting the throw of medals with the shoots 13, the medal count sensor 82 counting the number of medals that fell onto the collector 81, the medal count sensor 45 counting medals paid to players, the segment type of display unit 51, and the light emitting diode type of display unit 52. Still, the linear motors 72 and 77 for each driving the adjustment plates 71 and 76 are connected with each station CPU 300 by way of a drive control unit 304.

[0078] Referring to Figs.19 to 25, part of the operation of the game system will now be described. When power of the game system is turned on, the main CPU 200 performs a specified activation process, then performs various types of processing as described below.

[0079] Fig.24 shows processing performed by the main CPU 200, Figs.19 to 23 and 25 show processing performed by each station CPU 300. In these processes, setting the number of checkers in each station, control of the segment type of display unit 52, and others are executed. Actually, processing shown in Figs.19 to 25 is executed in parallel.

[0080] Fig.19 represents processing performed by each station CPU 300 in order to count the number of times of checker hit. The checker hit can be accumulated to up to four through this count processing.

[0081] At step S101, the checker-hit-number counter 301 (refer to Fig.18) is reset to a state that a count equals "0", before proceeding to step S102. At step S102, it is determined whether any of the available detectors 61A to 61C has detected medals passing therethrough. If the passage has been detected, the processing goes on to step S103, while if the passage has not been detected, the process at step S102 is repeated. At step S103, when it is determined that the count is "4", the processing is returned to step S102. But when the determination at step S103 is that the count is not "4", the count of the counter 301 is incremented at step S104, being returned to step S102. After this, steps S102 to S104 are repeated in the same way as above.

[0082] Thus, through the processing of Fig.19, when the passage of the medal is detected by any of the available detectors 61A to 61C, the count of the checker-hit-number counter is added by "1", whilst when the count has already been "4", no addition is performed. In the processing shown in Fig.21 described later, a lot is done in response to a checker hit, before the count for the checker hit is deducted by "1" (step S211), with the count changing within a range of 0 to 4 depending on the progress of a game.

[0083] The processing shown in Figs.20 to 23 is in charge of both setting available detectors (61A to 61C) to become an object for the checker hit, which is in the station CPU 300 of each station, and a lot and others when the checker hit occurs.

[0084] At step S201, initial setting is performed, by which an available detector to become an object for the checker hit is set to only the detector 61B, all of the checker-hit-number counter 301, the check-number-counter 302, and the detector-switch-determining counter 303 (see Fig.18) are reset, causing all the counter numbers being "0". At this time, the detector 61B is set to be available and both the detectors 61A and 61C are set to be unavailable. Hence, in this state, if a medal pass over the detection piece 63B shown in Fig.6, the passage of this medal is detected by the detector 61B and added to the count of the checker-hit-number counter 301 (step S104); however, if a medal passed over the detection piece 63A or 63C, this passage is not detected, the count of the counter 301 being unchanged.

[0085] At the next step S202, the count of the checker-hit-number counter 301 is read, proceeding to step S203. When this count is recognized as "0" at step S203, the processing is returned to S202. As long as the count is "0", the processing is repeated between steps S202 and S203. If the determination at step S203 is that the count is a value other than "0", that is, any one of "1" to "4", the processing then goes to step S204. At step S204, the result of a lot is decided by calculation, before the processing being continued to step S205 in Fig.21. In the lot carried out at step S204, (1): "odd hit" realized by three-digit figures made up of the same odd figures, (2): "even hit" realized by three-digit figures made up of the same even figures, (3): "check" realized by three-digit figures whose two figures are the same numbers (only one digit differs from the remaining ones), or (4): "missed" that does not correspond to any

one of the "odd hit", "even hit", and "check" is selected and calculation to determine the three-digit figures are carried out in each case. This three-digit figures thus-calculated are displayed as step S210 later described.

[0086] The calculation at step S204 is carried out based on conditions of progress of a game and other necessary data. For example, the result of a lot may be selected such that the paying-out rate gets closer to a given value.

[0087] At step S205, it is determined whether the lot result calculated at step S204 is "hit" or not. If the lot result is "hit", or "odd hit" or "even hit", the processing goes to step S206 where a hit flag is set to "on", then to step S206A where the check-number counter 302 (refer to Fig.18) is reset to "0" in count. The processing then proceeds to step S206B where the detector-switch-determining counter 303 (refer to Fig.18) is reset by putting "0" to its count. Then at step S207, the segment type of display unit 51 is ordered to display a state that a lot is now in progress. After this, at step S208, the determination whether the hit flag has been set to "off" or not is made. The processing waits until the hit flag is set to "off", then proceeding to step S210.

[0088] The hit flag is stored in each station CPU 300 and used for controlling flows when the medals are spouted, as described later. The count of the detector-switch-determining counter 303 is used by switch-determining processing (refer to Fig.23) that determines if the number of available detectors (61A to 61C) should be reduced from "3" to "1" or not.

[0089] On one hand, when it is determined at step S205 that the lot result is not "hit", the processing goes to step S209, where the segment type of display unit 51 is ordered to display a state that a lot is now in progress. Then, proceeding to step S209A where a count flag is examined. If the count flag is on, the processing goes to step S209B, while the count flag is off, the processing skips to step S210. The count flag is stored in each station CPU 300 and is turned on only when the lot done immediately before realized the "even hit" (refer to step S226 in Fig.22).

[0090] At step S209B, the count of the detector-switch-determining counter 303 is incremented, or increased by "1".

[0091] At step S210, the segment type of display unit 51 displays the lot result as three-digit numbers, then proceeding to step S211. At step S211, a value "1" is deducted from the count of the checker-hit-number counter 301, then going to step S212 of Fig.22.

[0092] At step S212, it is determined if the lot result is a "check" or not, and if the "check" is determined, the processing of step S213 is done, while if the lot result is not the "check", step S219 undergoes processing. At step S213, a value "1" is added to the count of the check-number counter 302, then going to step S214. At step 214, whether the count of the check-number counter 302 equals to "8" or not is determined. As a result, if the count is equal to "8", the processing is passed to step S216, whilst the count is a value other than "8", i.e., any one of "1" to "7", the processing is passed to step S215. At step S215, the number of lit elements of the light emitting diode type of display unit 52 is increased by one. Then at step S215A, detector-switch-determining processing (refer to Fig.23) is executed, before going to step S202 (see Fig.20).

[0093] Returning to step S214, if the count of the check-number counter 302 equals to "8", the processing is made to step S216, at which the count of the counter 302 is reset to "0". Then at step S217, the light emitting diode type display unit 52 is reset in display and all the light emitting elements are turned off. Then at step S218, all the detectors 61A to 61C are made available and the count flag is set to "off", before going to step S202 (see Fig.20).

[0094] In the case that all the detectors are available, when medals that fell from the fixed plate 41 pass over any of the detectors 63A to 63C shown in Fig.6, the passage of the medals is detected, and "1" may be added to the count of the checker-hit-number counter 301 at step S104 (Fig.19). Compared to the cases where only the detector 61B is available, a possibility of realizing the checker hit is raised.

[0095] As described above, if it is determined at step S212 that the lot result is not the "check", the processing goes to step S219. On one hand, if it is determined at step S219 that the lot result is the "even hit" whose three-digit figures are all the same even numbers, the processing goes to step S223. But the "even hit" is not determined at step S219, going to the next step S220.

[0096] If it is determined at step S220 that the lot result is the "odd hit" whose three-digit figures are all the same odd numbers, the processing is passed to step S221, where a medal spout flag for the main CPU 200 is set to "on". This medal spout flag is used to command the main CPU 200 to spout medals. Based on this command, processing for spouting medals is done, as will be described later. At step S222, all the detectors 61A to 61C are set to available ones, then going to step S222A, where the count flag is set to "off". Then the processing is returned to step S202 (Fig.20).

[0097] In contrast, when it is determined at step S220 that the lot result is not the "odd hit", detector-switch-determining processing (Fig.23) is executed at step S228, then returned to step S202 (Fig.20). In such a case corresponds to a "missed".

[0098] If determined at the foregoing step S219 is the "even hit", the processing proceeds to step S223, where the medal spout flag for the main CPU 200 is set to "on", before going to step S226. At step S226, the count flag is set to "on". At step S227, all the detectors 61A to 61C are set to available ones, then returning to step S202 (Fig.20).

[0099] Referring to Fig.23, the procedures of switch-determining processing will now be explained. At step S251, the count of the detector-switch-determining counter 303 is read. If the count is "7", the processing

advances to step S252, while if the count is not "7", it returns. At step S252, only the detector 61B is made available. Then at step S253, the detector-switch-determining counter 303 is reset, so its count becomes "0". Then at step 254, the count flag is set to "off".

[0100] In this way, through the processing in Figs.20 to 21, the number of available detectors (61A to 61C) is switched to "1" or "3" depending on the progress of a game, providing diversity to its developments. Specifically, when the "odd hit" is gained, all the three detectors are made available (step S222 in Fig.22). To the contrary, when the "even hit" is obtained, all the three detectors are first made available (step S227 in Fig.22). After this, however, if a "hit" is not gained during prosecution of a series of seven lots, only one detector is made available (step S253 in Fig.23). Additionally, even when the "hit" has not been achieved, all the three detectors are made available, provided the "check" has been achieved eight times (step S218 in Fig.22).

[0101] In view of the fact that the number of available detectors (61A to 61C) is altered according to the progress of games, so that frequencies in the checker hits vary. Thus developments of games are diversified, and players can more enjoy playing games.

[0102] Fig.24 shows processing for spouting medals carried out by the main CPU 200 in parallel with the other processing. At step S301, the medal spout flag is read, then going to step S302. The medal spout flag is set to "on" at step S223 or S221 in Fig.22. If it is determined at step S302 that the medal spout flag is "on", the processing proceeds to step S303, but if it is determined at step S302 that the flag is "off", the processing is returned to step S301 to repeat steps S301 and S302.

[0103] At step S303, data necessary for spouting medals are read from the station CPU 300. These data includes one or more sections (SC1 to SC6) to which medals should be supplied, the numbers of medals that should be supplied, and others. The number of medals to be spouted may be changed each time. Such number may be decided in order to get the paying-out rate close to a desired value or raise game performances.

[0104] At step S304, the medal count sensor initiates counting medals. At step S305, the drive control unit 204 rotationally drives the main hopper motor 123 and the drive control unit 205 rotationally drives the medal discharge motor 126b (refer to Fig.17). This drive control allows medals to be flipped out from the exit 124a of the escalator 124 by the urethane-made roller 126a, and then to be spouted up one after another at the center of the game system (refer to Figs.1, 14 and 15). Medals that ascend along the escalator 124 are counted by the medal count sensor 128.

[0105] Next, at step S306, the drive control unit 201a rotationally drives the rotary table drive motor 201 (refer to Fig.17). This control permits the rotary table 31 to rotate. At step S307, the drive control unit 202a drives the gate drive motor 202 to make specified one or more gates open according to data read at step S303. Through opened gates, a large number of medals are supplied from the rotary table 31 to specified one or more sections (SC1 to SC6).

[0106] At step S308, it is determined if the count of the medal count sensor 128 has reached a specified count (target count) read at step S303. When the determination is that the count has reached to it, the processing goes to step S309. In contrast, the determination is negative (has not reached yet), step S308 is repeated. Then at step S309, the drive control units 204 and 205 stops the main hopper motor 123 and medal discharge motor 126b, respectively. As a result, the medals stop spouting.

[0107] Then at step 310, a timer in the main CPU start to count time, and at step S311, waiting is done until this timer shows time is up. After this time-up, the processing advances to step S312. This timer is set to secure a sufficient interval during which medals on the rotary table 31 are supplied to specified one or more sections (SC1 to SC6). At step S312, this timer is reset.

[0108] At step S313, the drive control unit 202a drives the gate drive motor 202 to close the gate that has opened. At step S314, the drive control unit 201a controls so as to stop the rotary table drive motor 201, which causes the rotary table 31 to be stopped. At step S315, the medal spout flag is set to "off", then returned.

[0109] Referring to Fig.25, controlling the paying-out rate will now be explained. The processing of Fig.25 is executed by the station CPU 300 of each station.

[0110] At step 401, the hit flag is read, then the processing advances to step S407, provided the hit flag is "on". In contrast, the flag is "off", the processing advances to step 402, at which the number of medals inserted (called "medal-in addition value") into the medal game system for a given time is read and subject to the determination whether or not the medal-in addition value is larger than a predetermined given value. If the determination is affirmative, the processing goes to step S403, but it is negative, the processing returns to step S401. The medal-in addition value is counted using detection signals from both the medal throw sensor 13b and the medal count sensor 128, and memorized sequentially in a memory of each station CPU 300. While the game system is in operation, the total-in number (i.e., the number of inserted medals in total) is updated constantly.

[0111] At step S403, by comparing an actual paying-out rate or correlation values or others relevant to the actual paying-out rate with a target paying-out rate or a target value, positions of the adjustment plates 71 and 76 (Fig.8) to be set are calculated. The paying-out rate or its relevant values can be figured out on the basis of the detection signals from the medal throw sensor 13b and the medal count sensors 128, 82, and 45.

[0112] At step S404, the drive control unit 304 drives the linear motors 72 and 77 to move the moving plates 71 and 76 to desired positions. At step S405, the total-in number is reset to "0", then the processing is returned.

Therefore, at step S402, based on data accumulated for an interval from the reset of the total-in number to its arrival at a given value, the determination is performed.

[0113] The total-in number and actual paying-rate or the correlation values can be given as integral values or averages concerning arbitrarily set intervals. For example, integral values or averages calculated from turning on the game system to the present time may be used. Alternatively, those values for one day (24 hours) or one hour immediately before may be adopted.

[0114] The target paying-out rate or target values can also be set arbitrarily. Those rate or values may be defined as constant values at any time so as to make the paying-out rate close to given value dedicatedly, for example. Alternatively, those rate or values can by altered according to progress conditions of a game. Moreover, those rate or values may be fluctuated in accordance with the total-in number per a specified time zone in one day, a day, or a period of specified one or more hours. Still, a design is also possible that an operator can set those rate or values freely by hand.

[0115] The paying-out rate can be set differently station by station. In such case, a configuration may be adopted that the paying-out rate for each station is decided with the paying-out rate over the entire game system taken into consideration. To be specific, for example, the adjustment plate 71 for adjusting the paying-out rate in the foregoing paying-out adjusting mechanism 70 is controlled to only three positions, and the adjustment of the paying-out rate tend to be rough to some extent. To overcome this difficulty, the adjustment plate 71 may be positioned differently station by station, the paying-rates over the entire game system can be averaged to a finer rate in a controlled fashion. An alternative example is that the positions of the adjustment plates 71 for all the stations are not adjusted at a time, and those adjustment times are shifted each other, providing the same effects as the above. In this case, a CPU corresponding to the main CPU 200 handles such positional control of the adjustment plates.

[0116] Where the paying-out rates are different station by station, it is possible that an average of those paying-out rates is kept constant, but, for example, each paying-out rate for each station is fluctuated every specified interval at random or regularly.

[0117] As stated above, after the determination of the hit flag "on" at step S401, the processing goes to step S407. The similar calculation to step S403 is carried out at step S407, but at this step, the positions of the adjustment plates 71 and 76 are decided on condition that a medal spout is carried out. And at step S408, the adjustment plates 71 and 76 are moved to the decided positions. At step S409, the hit flag is set to "off" before returning. Since, after the hit flag that set to "off" has been confirmed (step S208 in Fig.21), medals are spouted (steps S221 and S223 in Fig.22), the adjustment plates 71 and 76 have already been set at desired positions at a time when the medal is spouted.

[0118] Therefore, owing to the fact that the positions of the adjustment plates 71 and 76 are adjusted every time when the total-in number reaches a given value, the paying-out rates are properly set in an automatic fashion, without cumbersome operation and work toward the game system (step S402 to S405 in Fig.25).

[0119] In cases where the medal spout processing is executed, a target rate different from a normal paying-out rate is set and the adjustment plates 71 and 76 are driven in conformity with the target rate. Therefore, it can be done that the entire paying-out rates are controlled accurately or the flows of medals are set to enhance game characteristics (step S407 to 409).

[0120] As an alternative example, the adjustment of the paying-out rates, which is done by moving the adjustment plates, may be performed during the spout of medals or during the rotation of the rotary table 31.

[0121] As described above, the progress of games can be diversified, and the flows of medals and the paying-out rates can be managed properly.

[0122] Although the description above contains many specificities, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. Thus the scope of this invention should be determined by the appended claims and their legal equivalents.

Claims

1. A medal game system that supplies a medal through a field has an apparatus for controlling supply of the medal, characterized in that the apparatus comprises:

   a detecting device which detects a flow of the medal passing the field; and
   an adjusting device which physically adjusts the flow of the medal based on information given by the detecting device.

2. The medal game system of claim 1, wherein the adjusting device adjusts a paying-out rate of the medal paid from the medal game system.

3. The medal game system of either of claim 1 or 2, wherein the flow of the medal spreads into a first branch flow for paying the medal to a player and a second branch flow for recovering the medal and the adjusting device adjusts a flow ratio of the medal between the first and second branch flows.

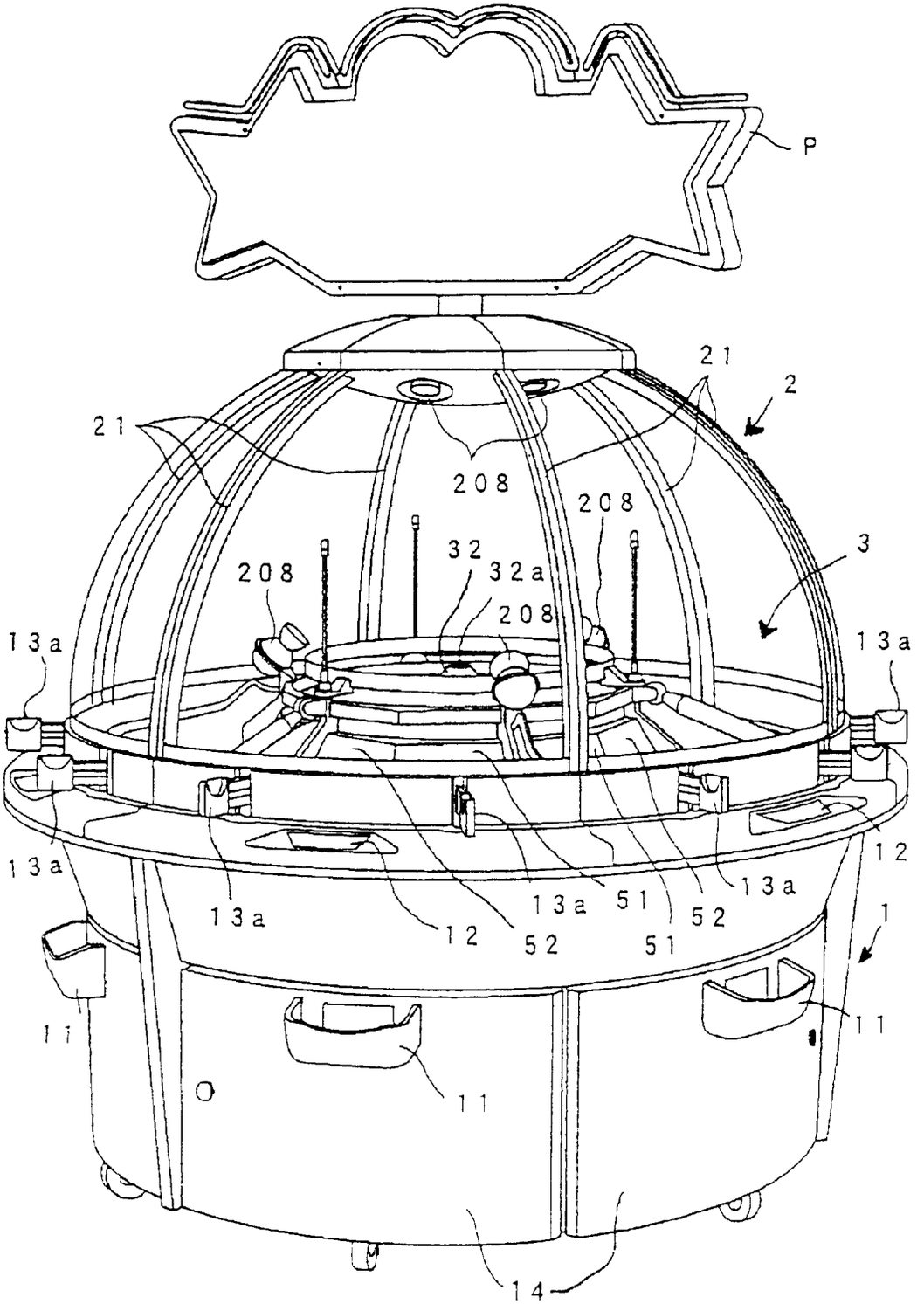
4. The medal game system of any one of claims 1 to 4, wherein the adjusting device is constructed to adjust a width of a passageway though which the medal passes.

5. The medal game system of any one of claims 1 to 4, wherein the adjusting device consists of a member movably arranged so as to interfere movement of the medal.

6. The medal game system of any one of claims 1 to 4, wherein the adjusting device consists of a member for changing a slope of a passageway through which the medal flows.

7. The medal game system of any one of claims 1 to 6, wherein the medal game system has a game system body comprising a moving member reciprocating-moved within the field and a construction in which at least part of the medals that are made to fall from the field are paid to a player utilizing a reciprocating motion of the moving member.

FIG. 1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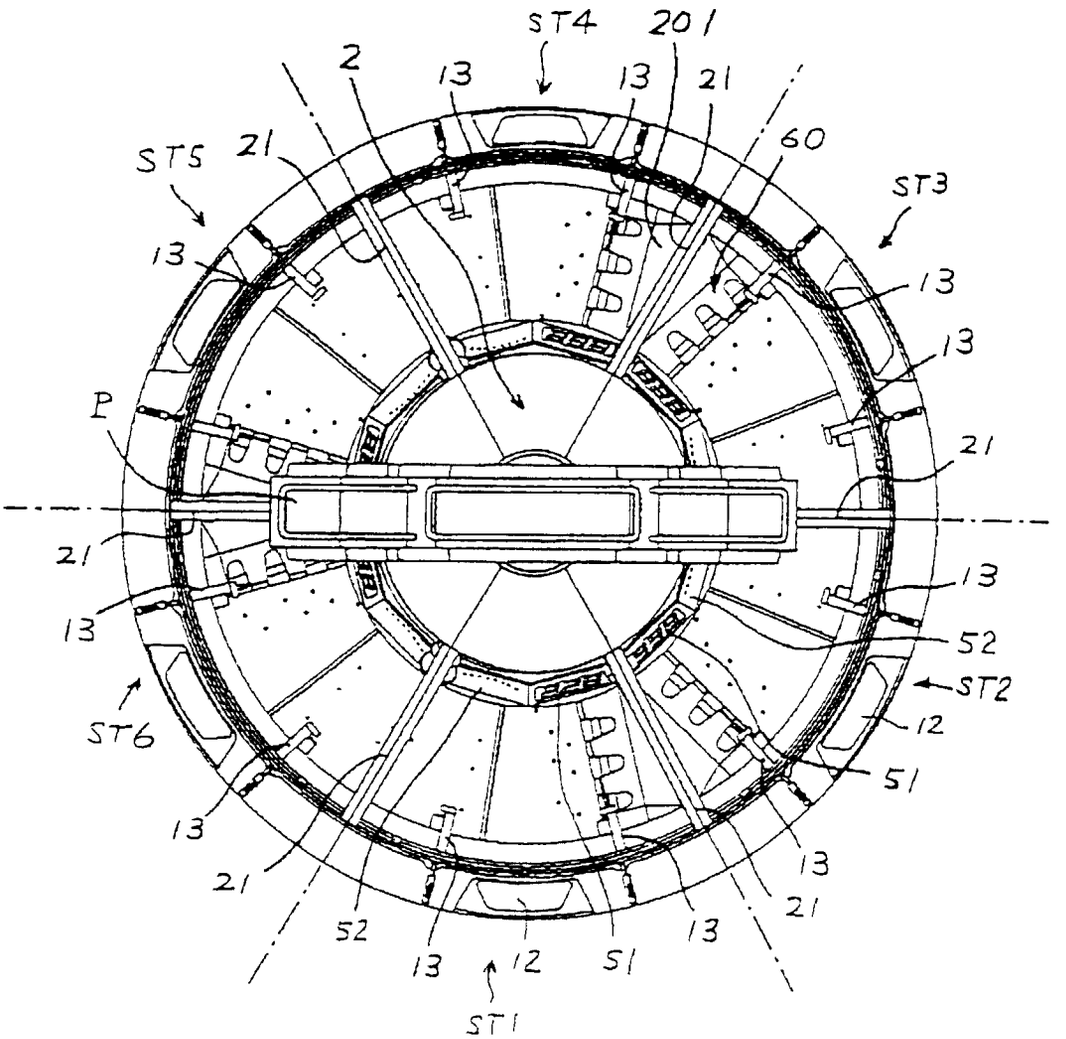
11
14

FIG. 2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ST5
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ST3
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51
13
ST1

FIG. 3

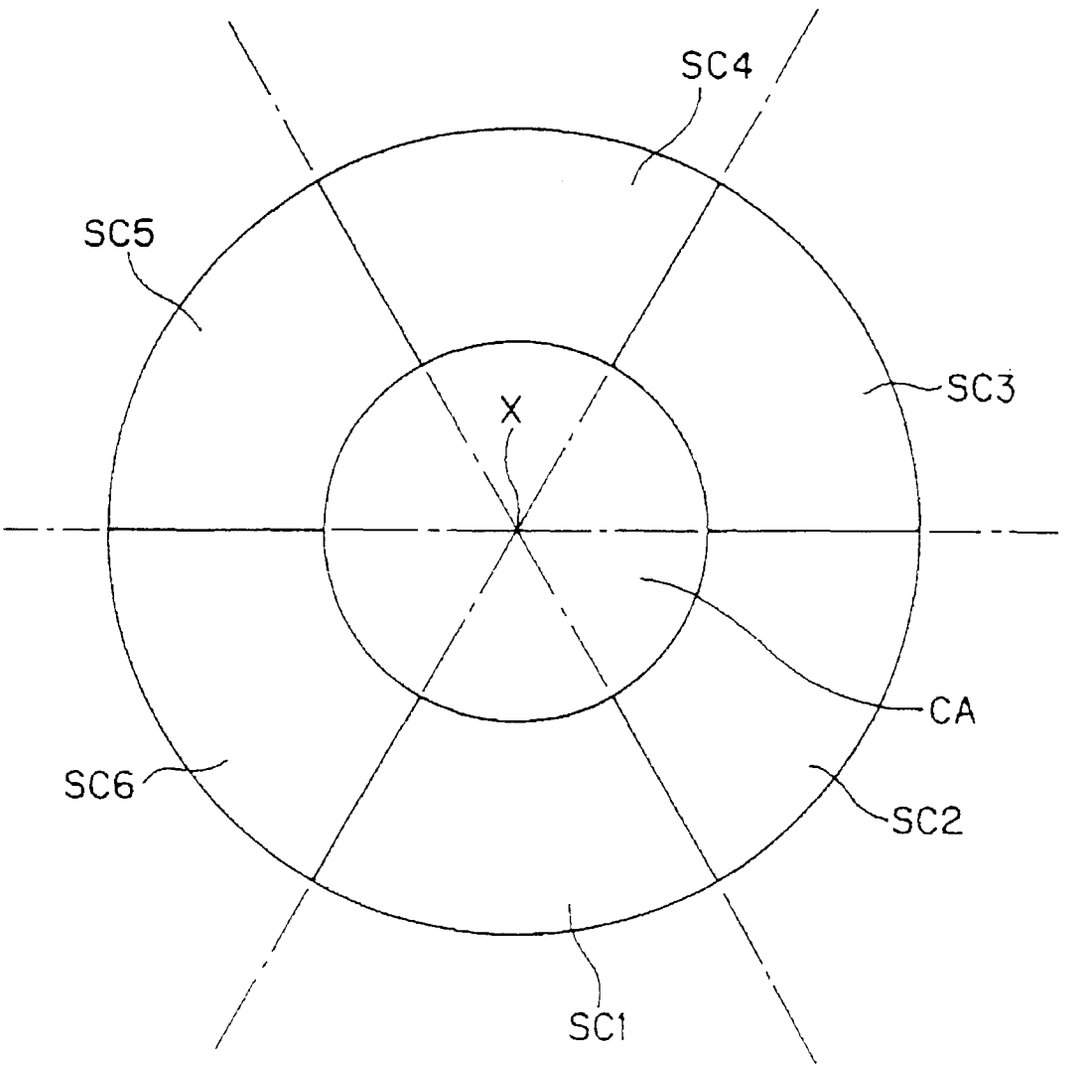
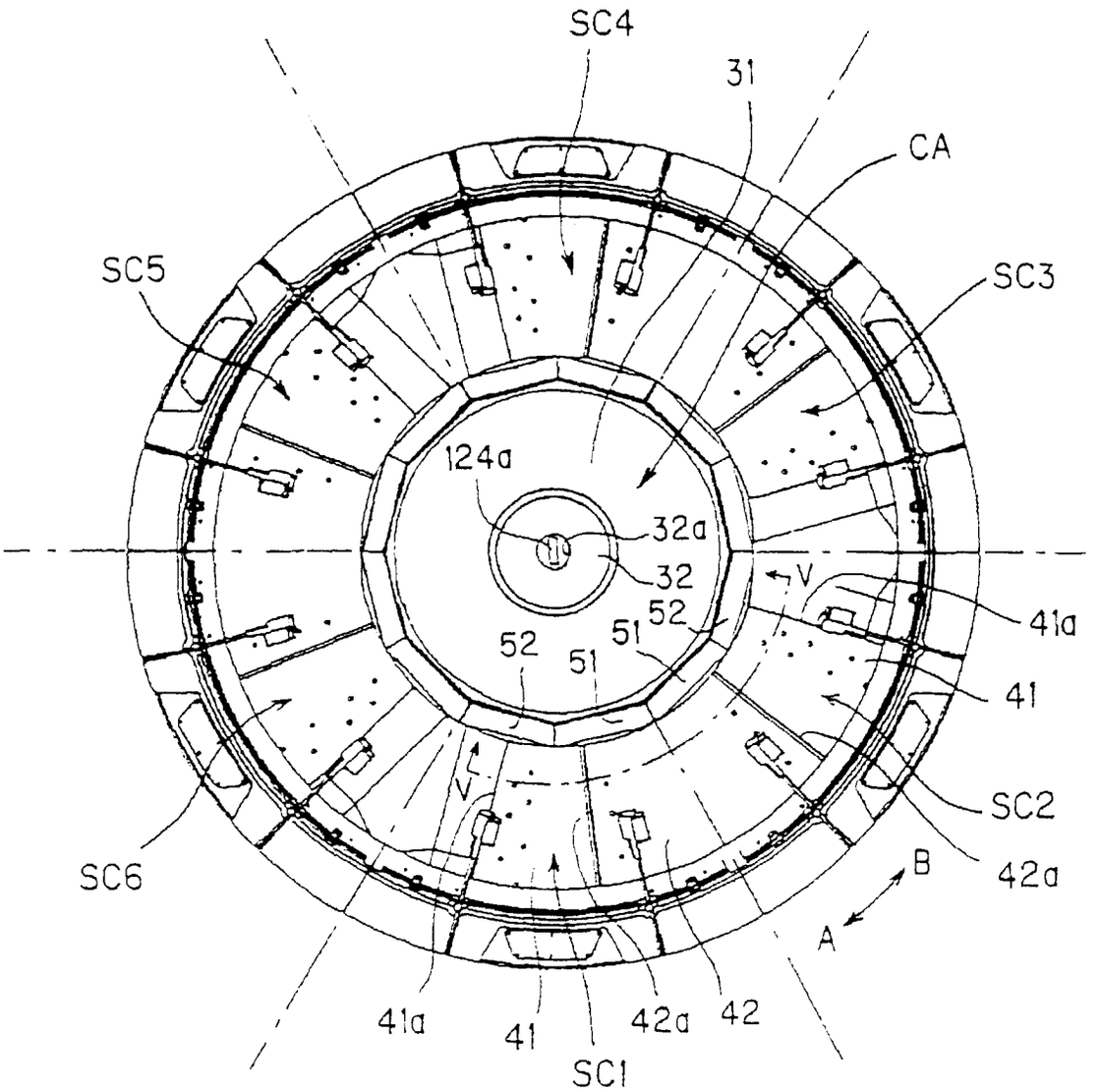


FIG. 4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31
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SC5
SC3
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32a
32
V
52
51
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52
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41
V
SC2
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SC1

FIG. 5

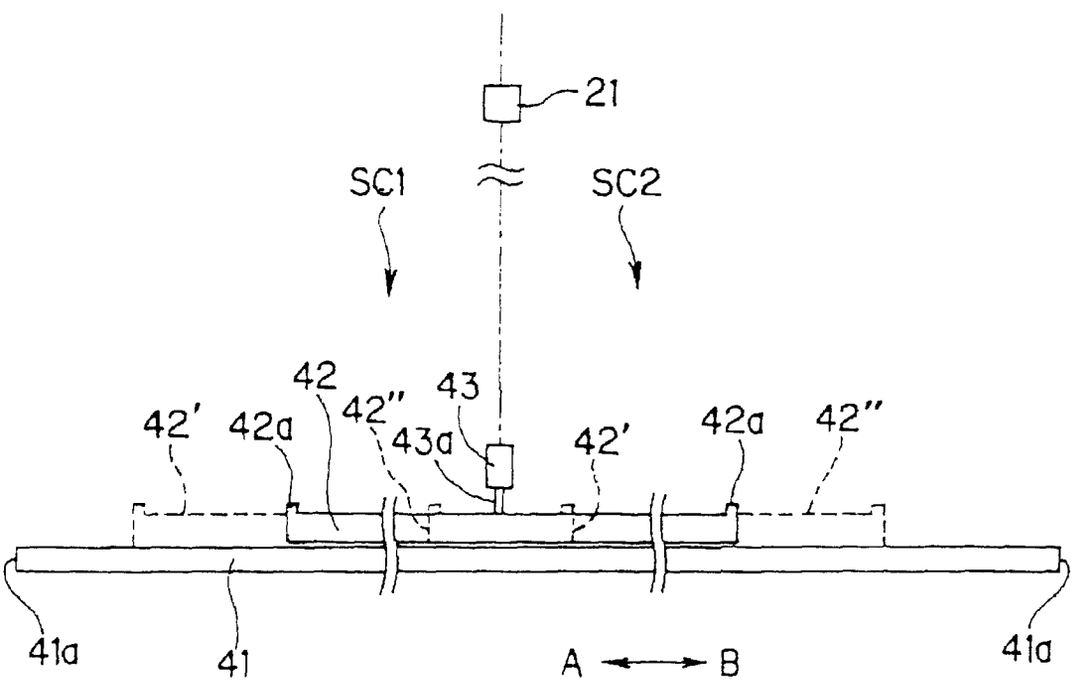


FIG. 6

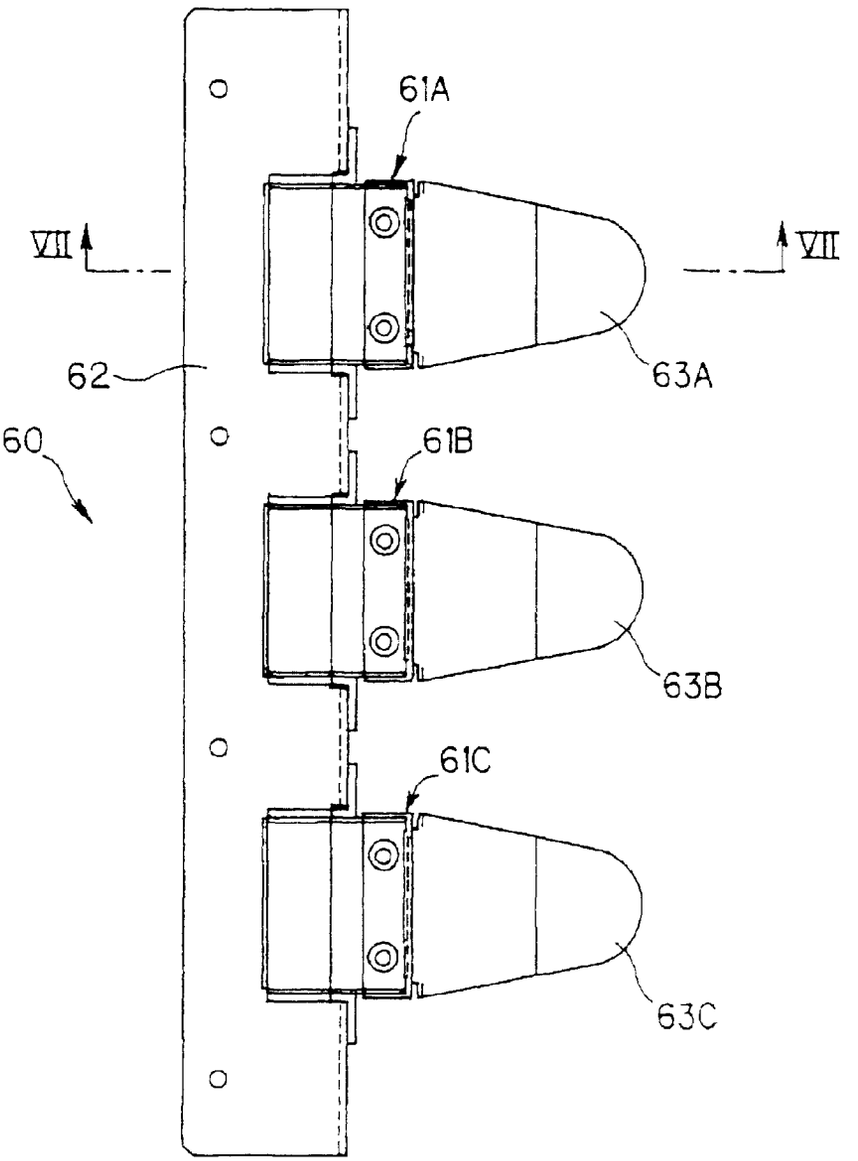
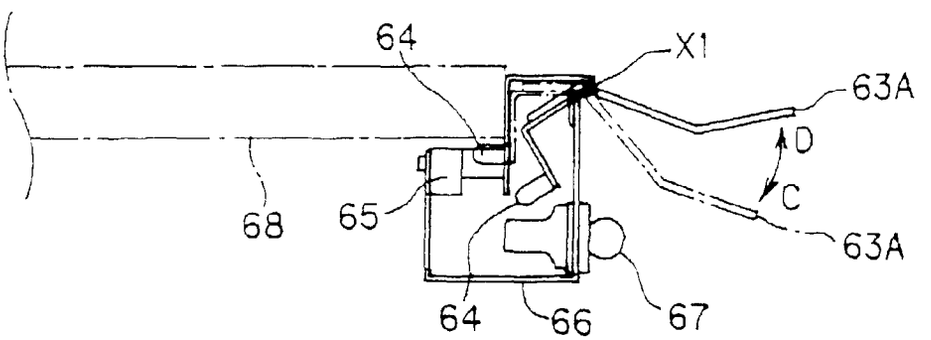

61A
VII
VII
62
63A
60
61B
63B
61C
63C

FIG. 7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X1
63A
D
C
63A
68
65
64
66
67

FIG. 8

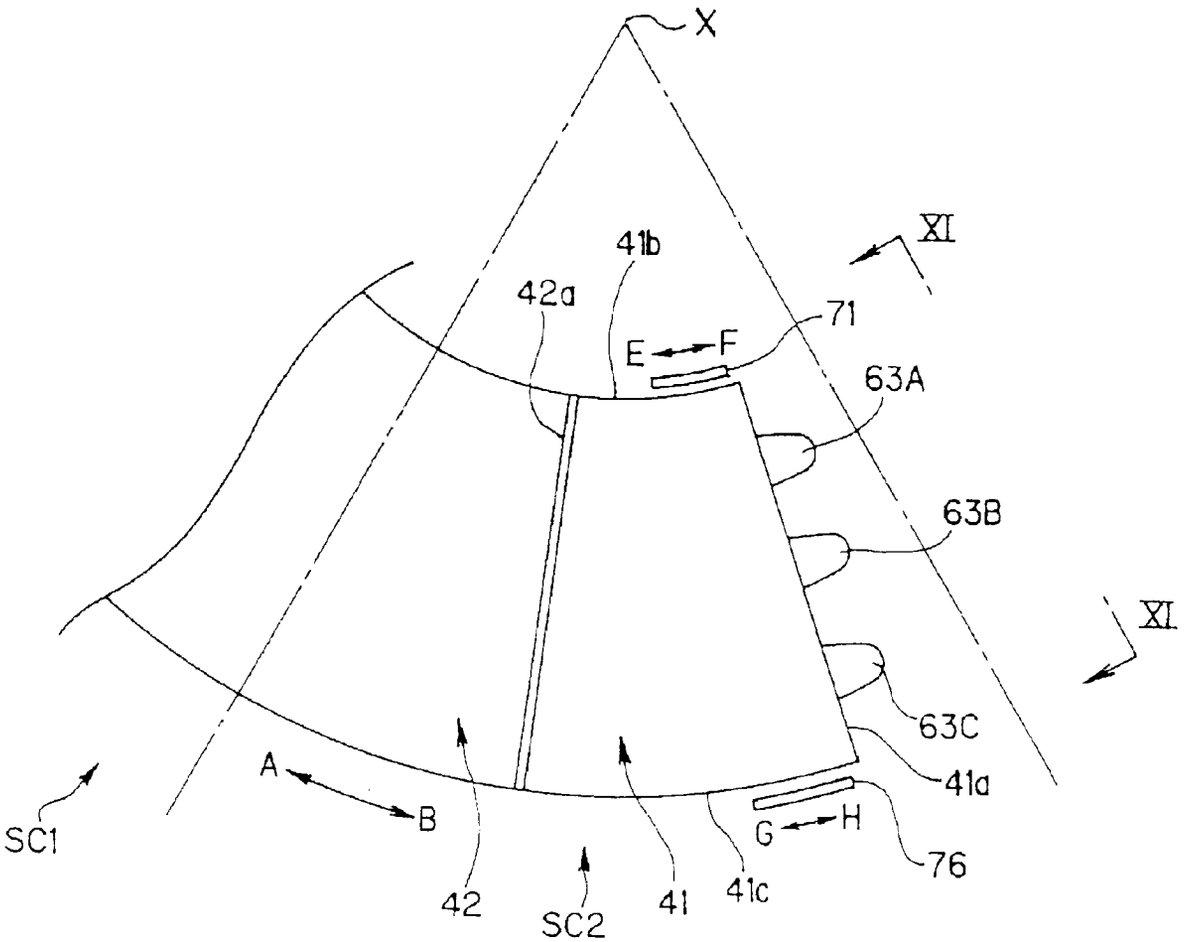


FIG. 9

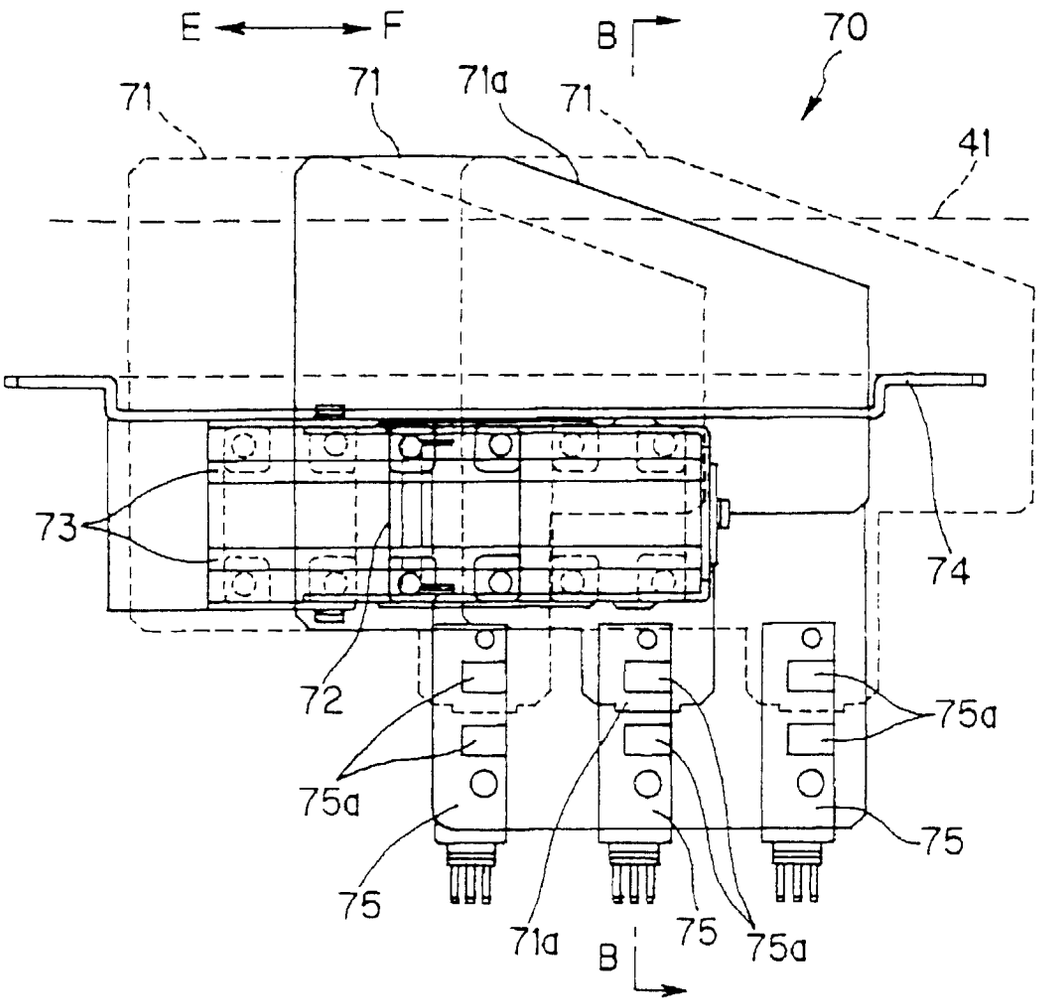
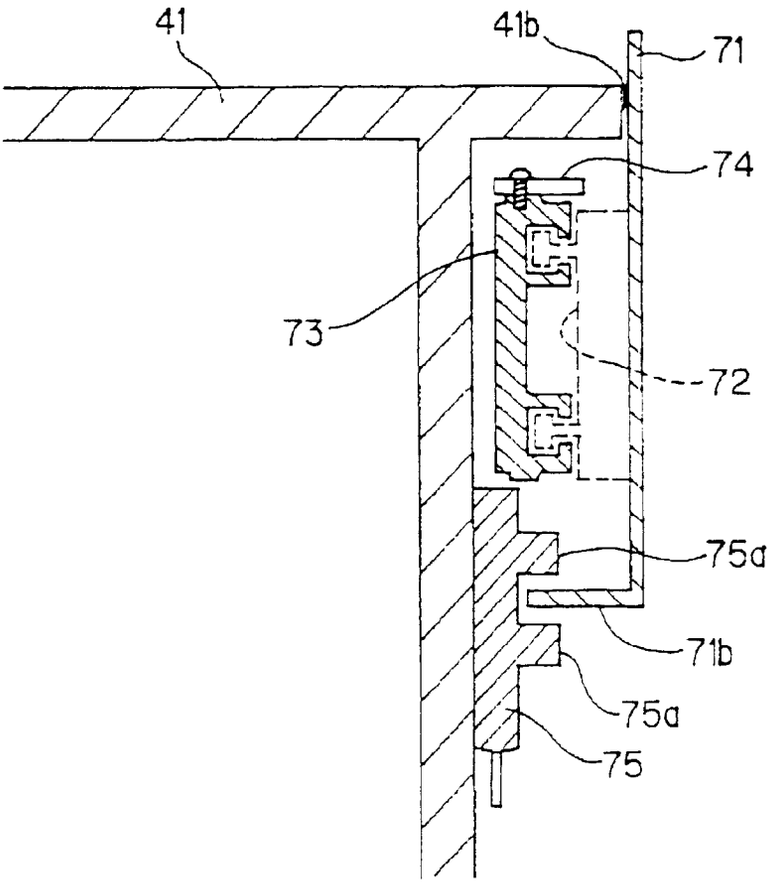


FIG.10


41
41b
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74
73
72
75a
71b
75a
75

FIG.11

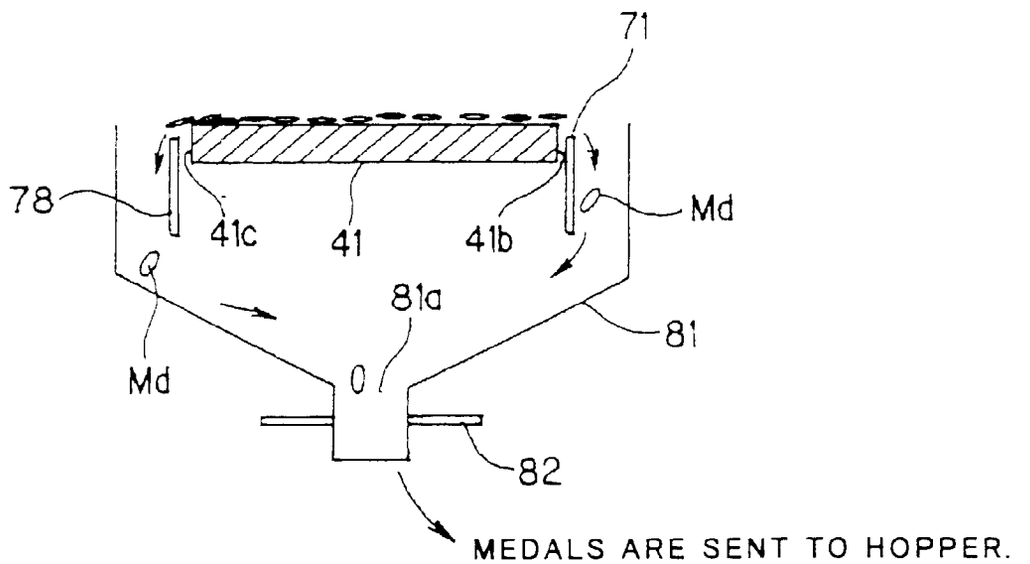
71
78
41c
41
41b
Md
Md
81a
81
0
82
MEDALS ARE SENT TO HOPPER.

FIG. 12

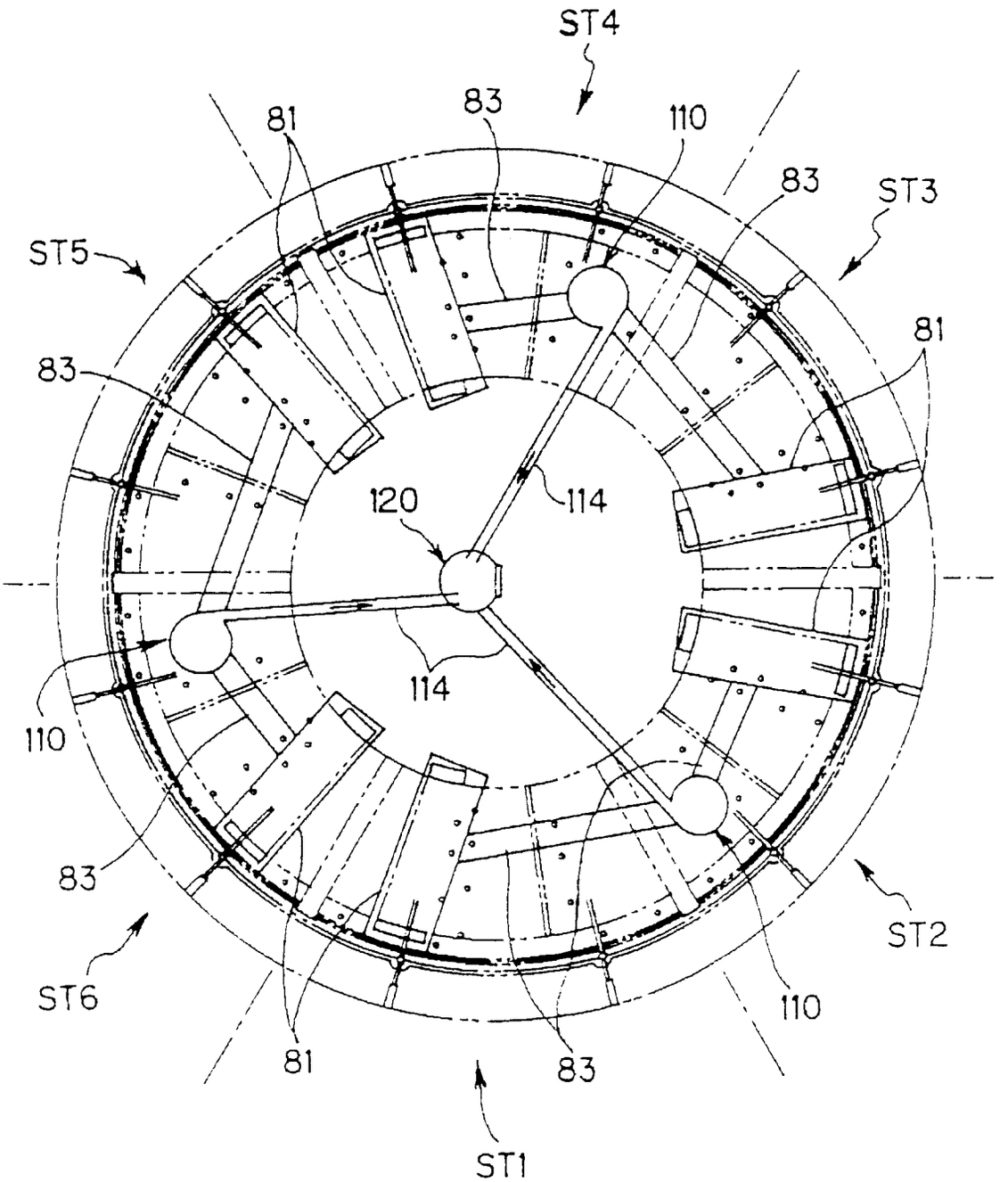
ST4
81
83
110
83
ST3
ST5
81
83
120
114
114
110
83
ST2
ST6
110
81
83
ST1

FIG.13

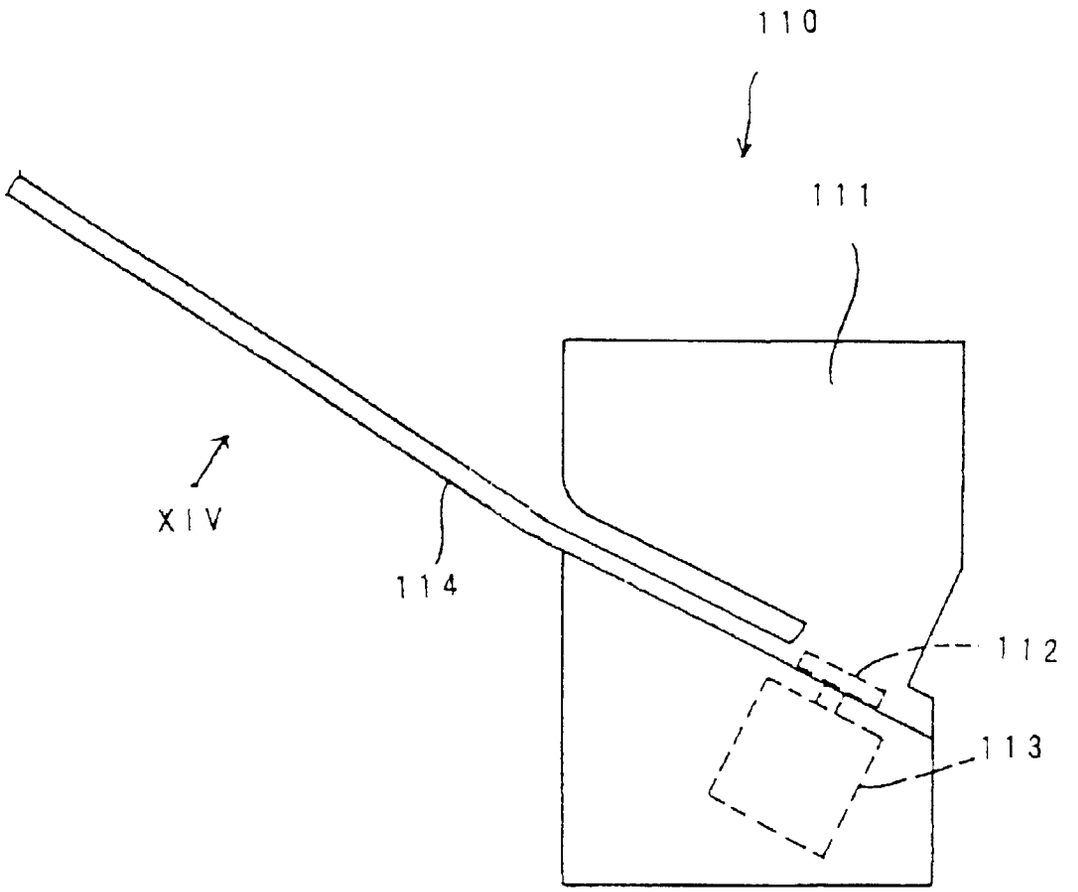

FIG. 14

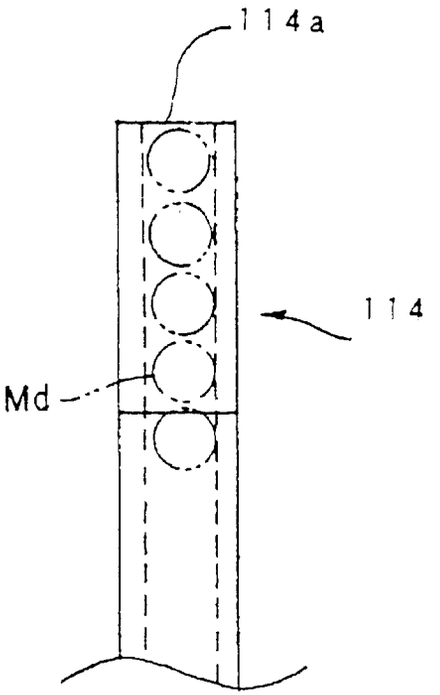

FIG.15

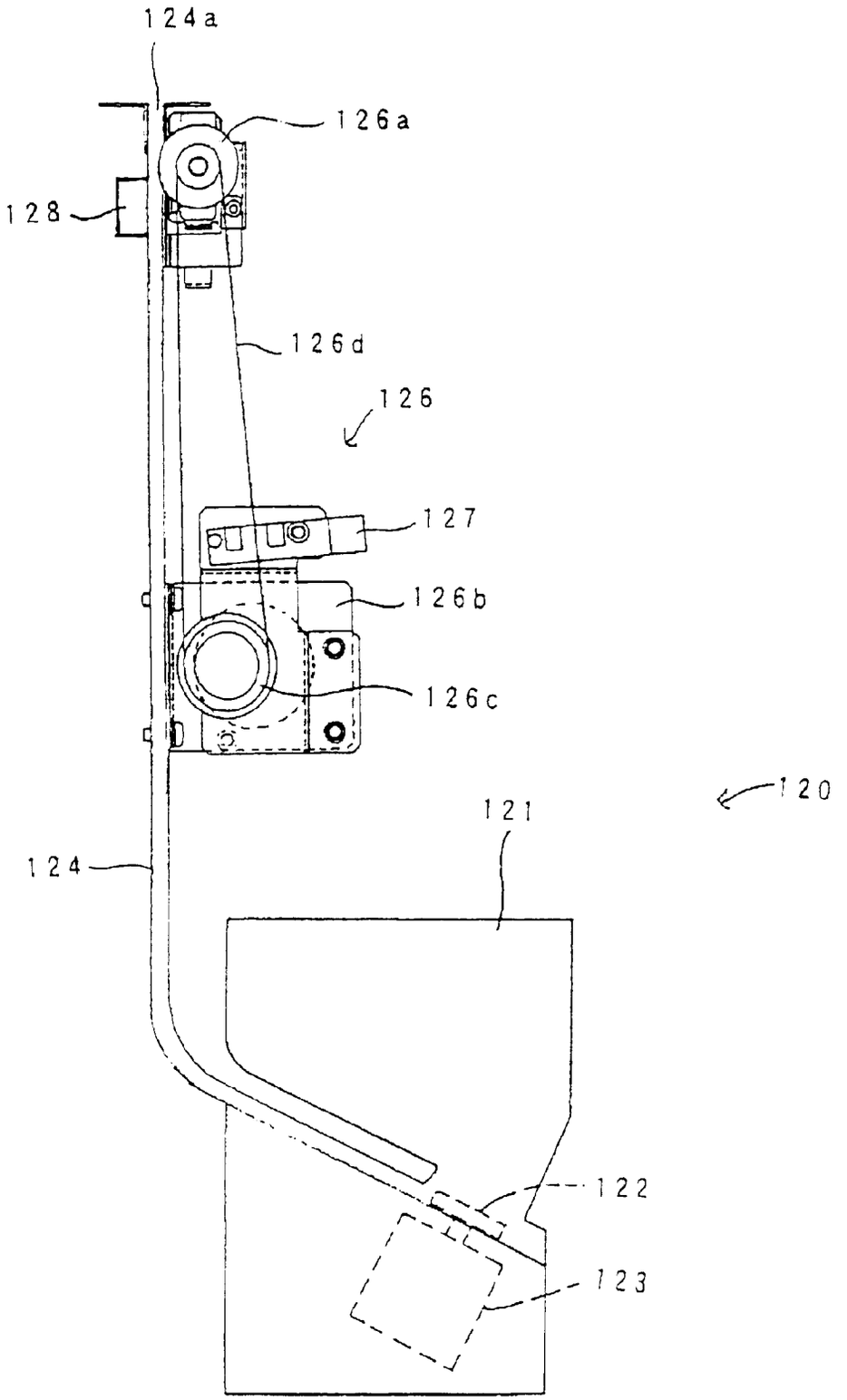

FIG. 16

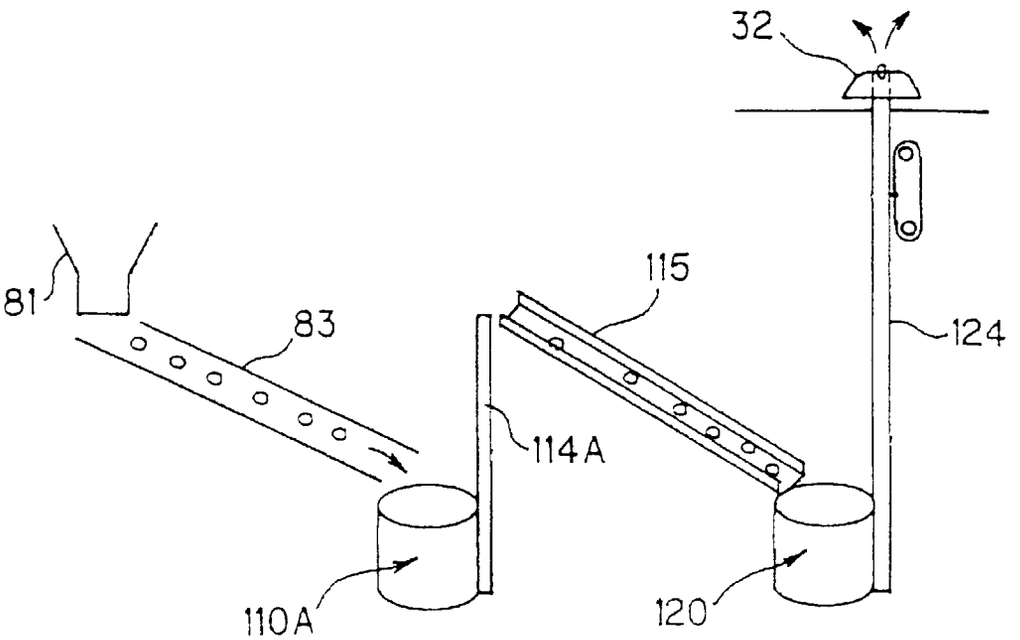

FIG.17

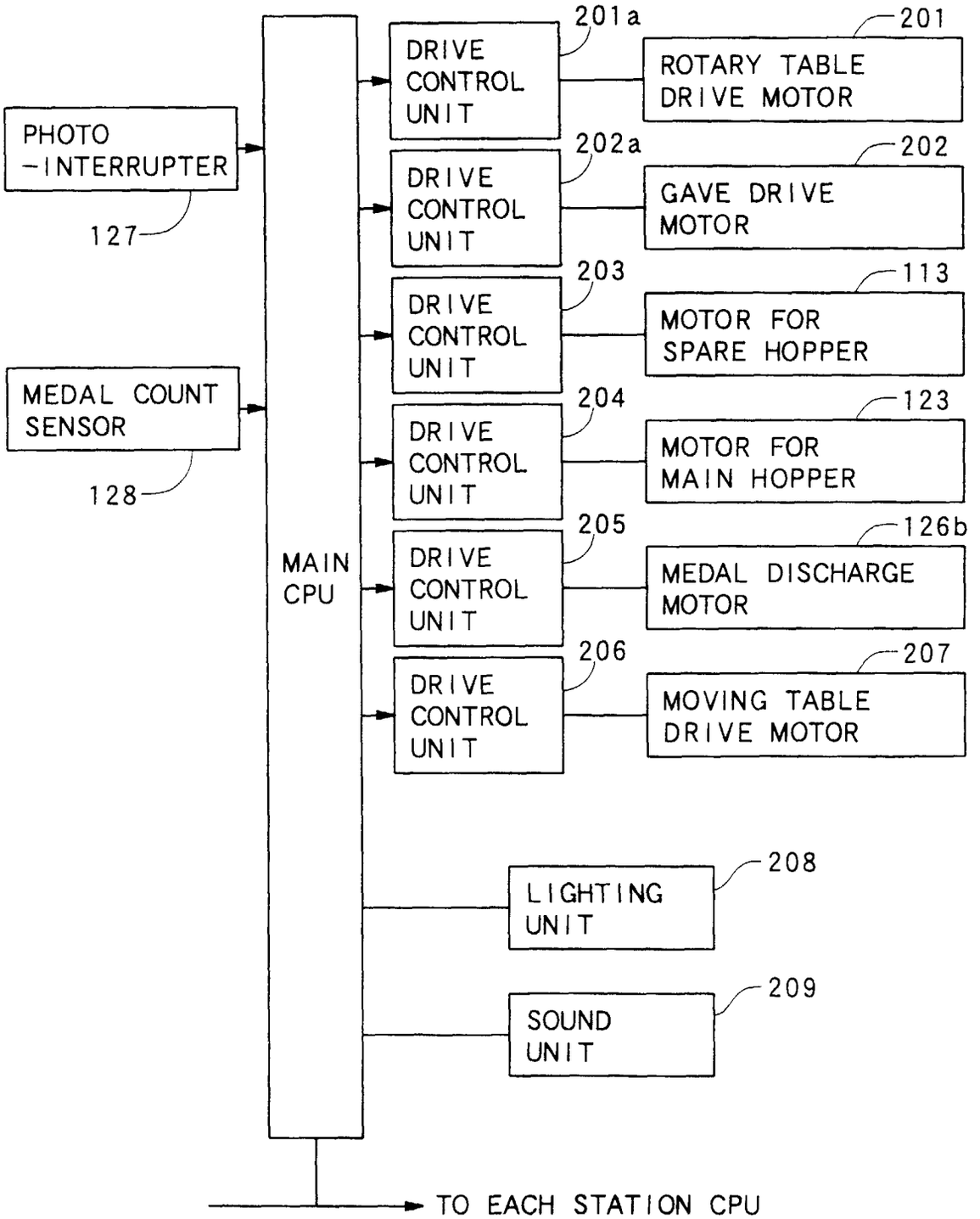
PHOTO
-INTERRUPTER
127
MEDAL COUNT
SENSOR
128
MAIN
CPU
DRIVE
CONTROL
UNIT
201a
ROTARY TABLE
DRIVE MOTOR
201
202a
GAVE DRIVE
MOTOR
202
203
MOTOR FOR
SPARE HOPPER
113
204
MOTOR FOR
MAIN HOPPER
123
205
MEDAL DISCHARGE
MOTOR
126b
206
MOVING TABLE
DRIVE MOTOR
207
LIGHTING
UNIT
208
SOUND
UNIT
209
TO EACH STATION CPU

FIG. 18

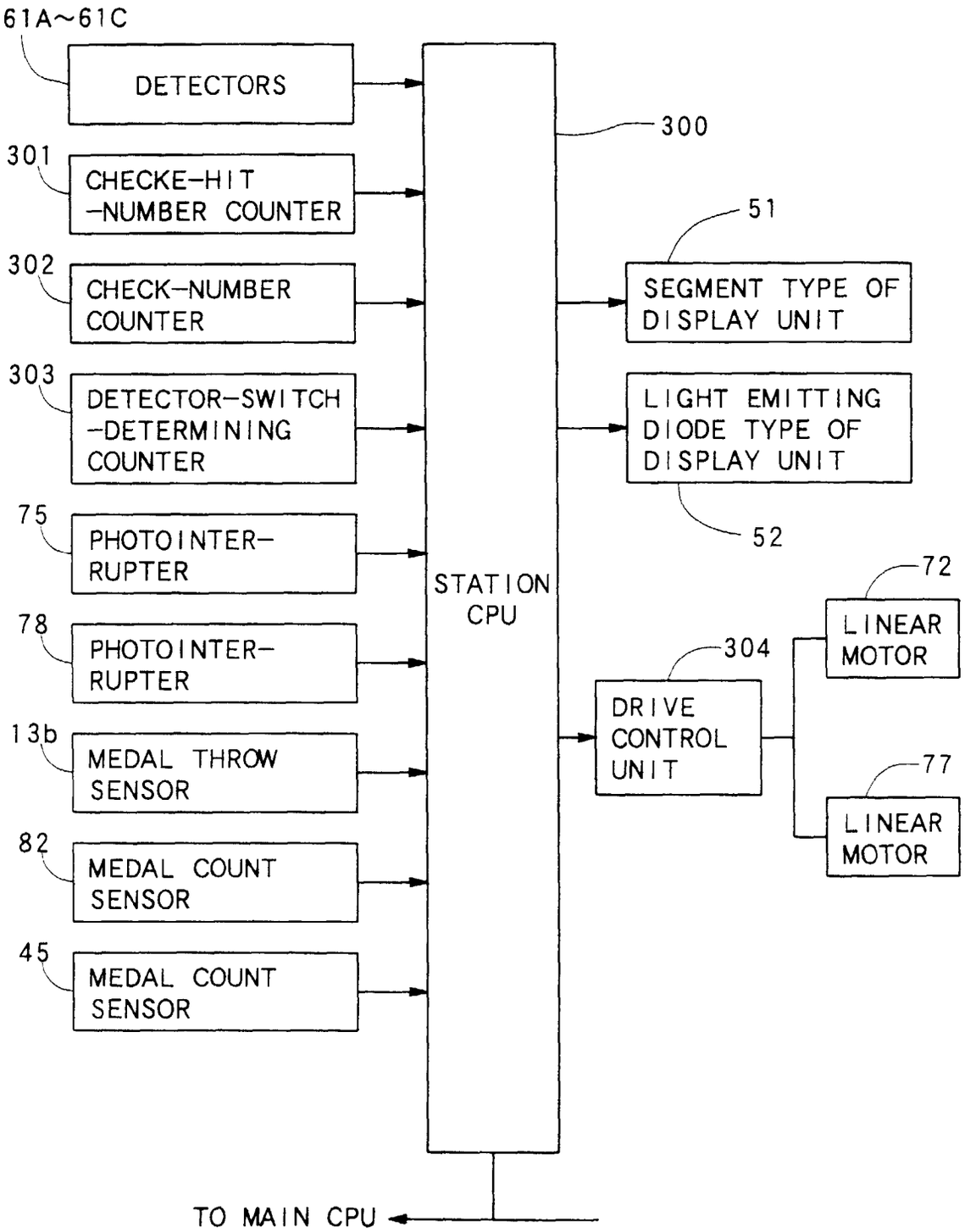
61A~61C
DETECTORS
301
CHECKE-HIT -NUMBER COUNTER
302
CHECK-NUMBER COUNTER
303
DETECTOR-SWITCH -DETERMINING COUNTER
75
PHOTOINTER-RUPTER
78
PHOTOINTER-RUPTER
13b
MEDAL THROW SENSOR
82
MEDAL COUNT SENSOR
45
MEDAL COUNT SENSOR
STATION CPU
300
51
SEGMENT TYPE OF DISPLAY UNIT
LIGHT EMITTING DIODE TYPE OF DISPLAY UNIT
52
304
DRIVE CONTROL UNIT
72
LINEAR MOTOR
77
LINEAR MOTOR
TO MAIN CPU

FIG.19

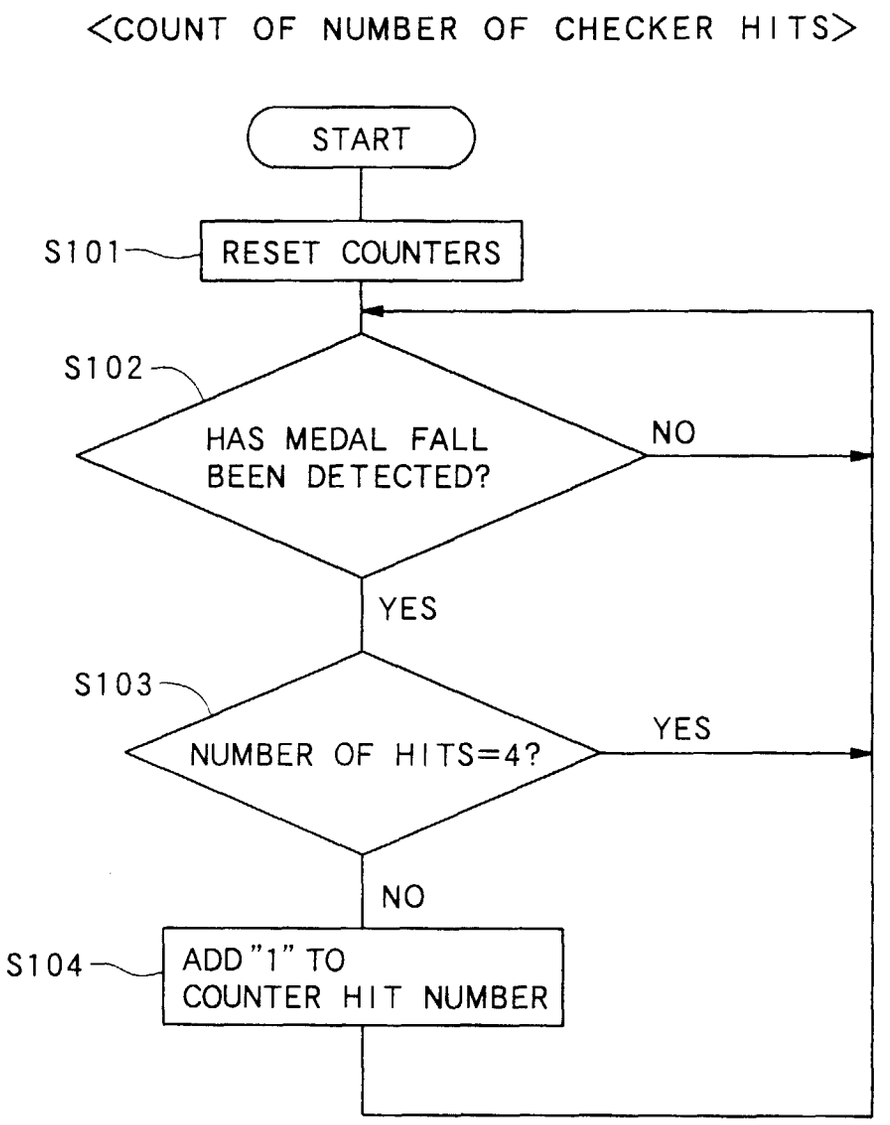
<COUNT OF NUMBER OF CHECKER HITS>
START
S101
RESET COUNTERS
S102
HAS MEDAL FALL BEEN DETECTED?
NO
YES
S103
NUMBER OF HITS=4?
YES
NO
S104
ADD "1" TO COUNTER HIT NUMBER

FIG.20

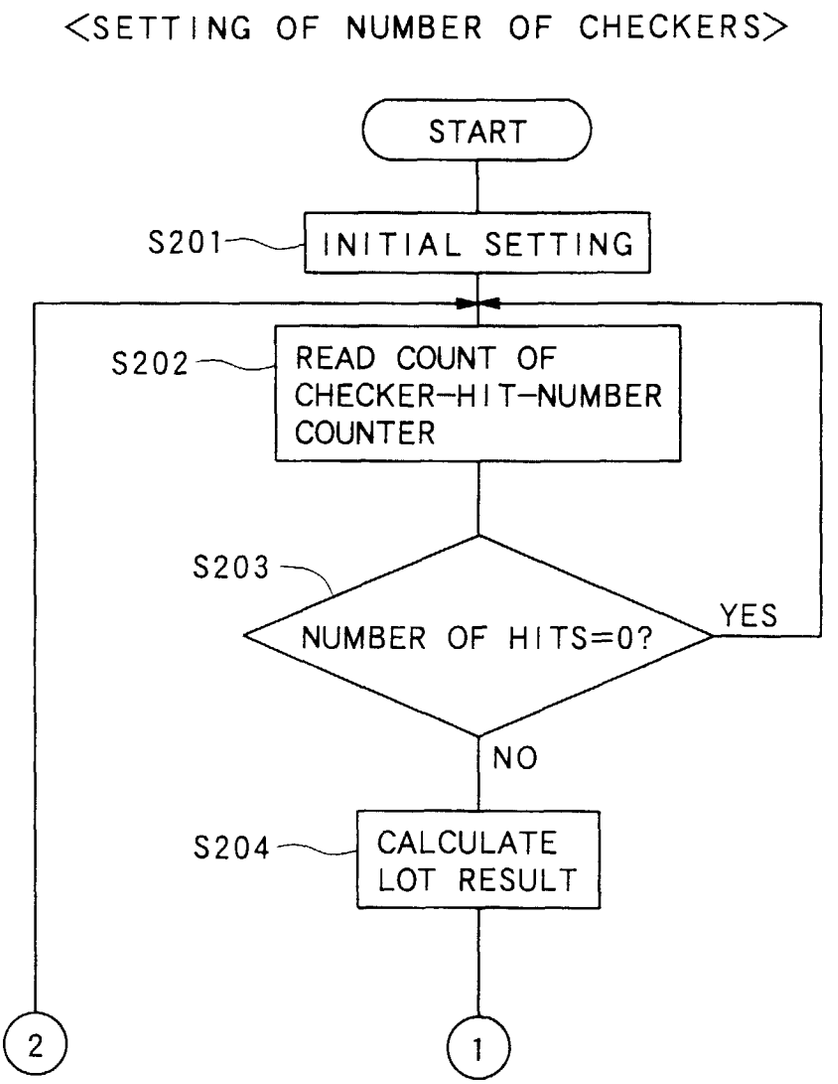
<SETTING OF NUMBER OF CHECKERS>
START
S201
INITIAL SETTING
S202
READ COUNT OF CHECKER-HIT-NUMBER COUNTER
S203
NUMBER OF HITS=0?
YES
NO
S204
CALCULATE LOT RESULT
2
1

FIG.21

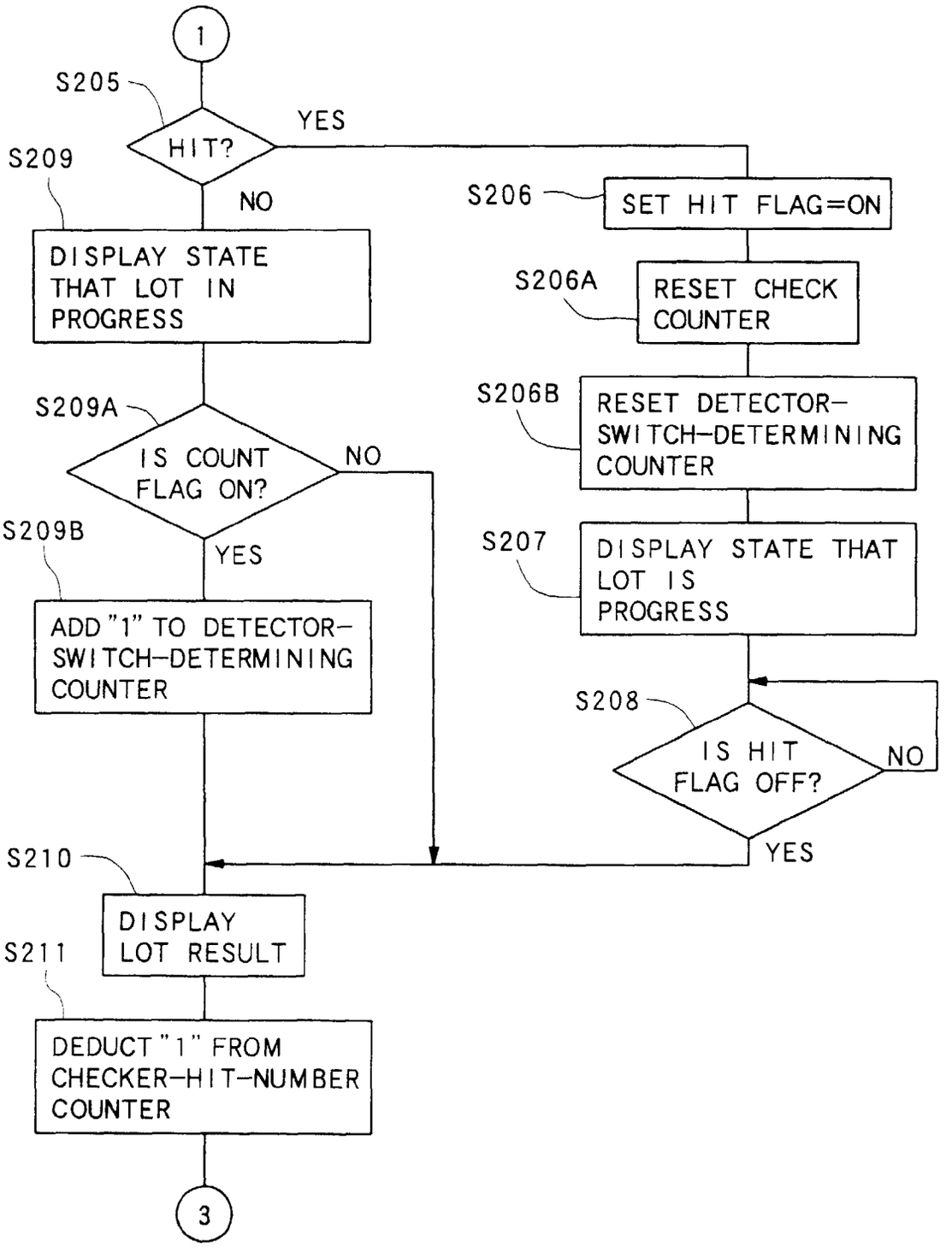
1
S205
HIT?
YES
NO
S209
DISPLAY STATE THAT LOT IN PROGRESS
S209A
IS COUNT FLAG ON?
NO
YES
S209B
ADD "1" TO DETECTOR-SWITCH-DETERMINING COUNTER
S206
SET HIT FLAG=ON
S206A
RESET CHECK COUNTER
S206B
RESET DETECTOR-SWITCH-DETERMINING COUNTER
S207
DISPLAY STATE THAT LOT IS PROGRESS
S208
IS HIT FLAG OFF?
NO
YES
S210
DISPLAY LOT RESULT
S211
DEDUCT "1" FROM CHECKER-HIT-NUMBER COUNTER
3

FIG.22

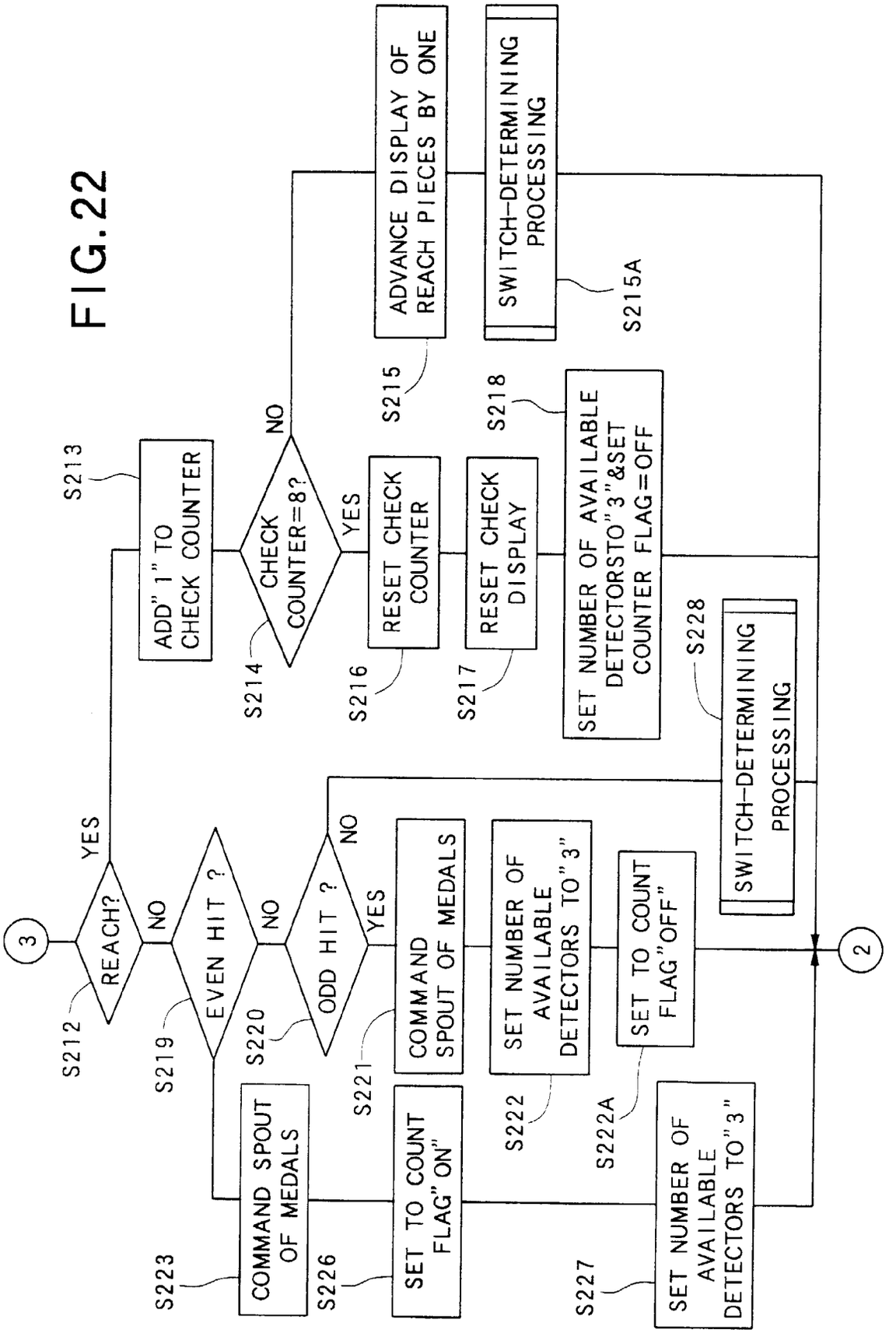
3
REACH?
YES
NO
S212
ADD" 1" TO CHECK COUNTER
S213
CHECK COUNTER=8?
NO
YES
S214
ADVANCE DISPLAY OF REACH PIECES BY ONE
S215
RESET CHECK COUNTER
S216
RESET CHECK DISPLAY
S217
SET NUMBER OF AVAILABLE DETECTORSTO"3"&SET COUNTER FLAG=OFF
S218
SWITCH-DETERMINING PROCESSING
S215A
SWITCH-DETERMINING PROCESSING
S228
EVEN HIT ?
S219
NO
ODD HIT ?
S220
NO
YES
COMMAND SPOUT OF MEDALS
S221
SET NUMBER OF AVAILABLE DETECTORS TO"3"
S222
SET TO COUNT FLAG"OFF"
S222A
COMMAND SPOUT OF MEDALS
S223
SET TO COUNT FLAG"ON"
S226
SET NUMBER OF AVAILABLE DETECTORS TO"3"
S227
2

FIG.23

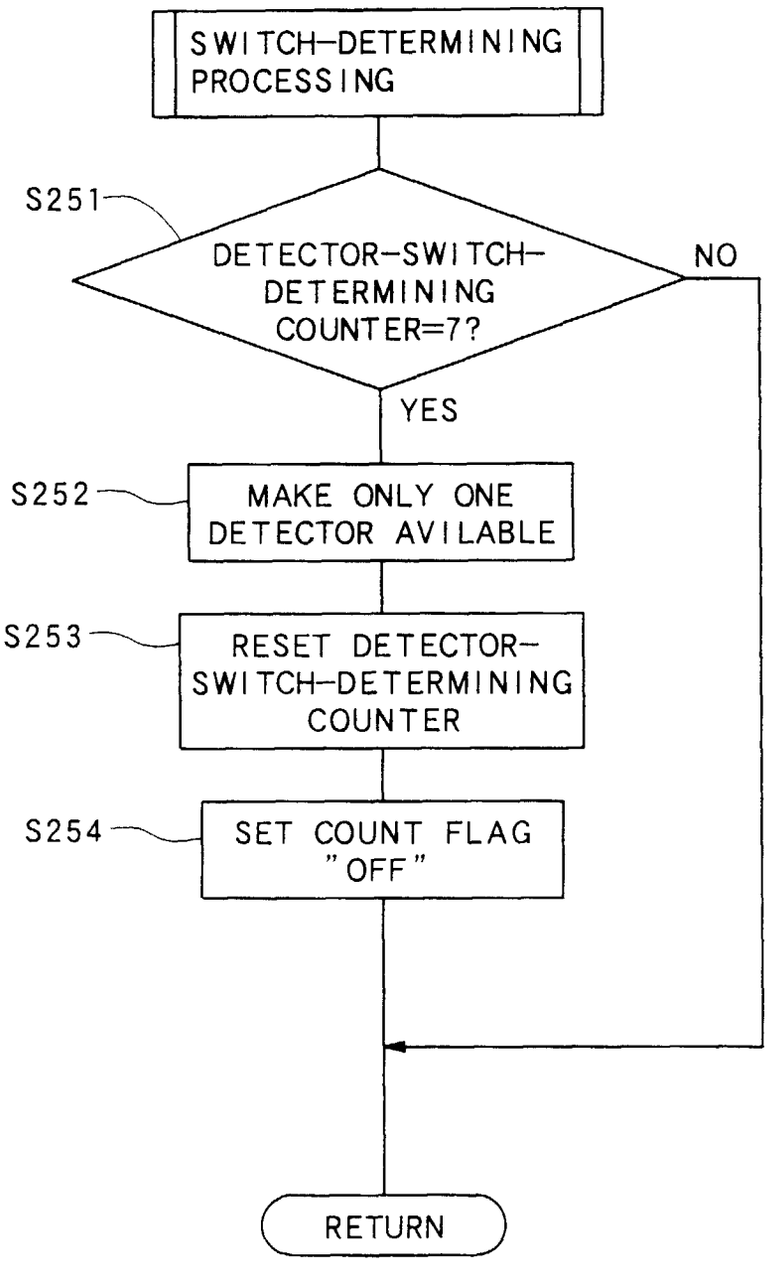
SWITCH-DETERMINING PROCESSING
S251
DETECTOR-SWITCH-DETERMINING COUNTER=7?
NO
YES
S252
MAKE ONLY ONE DETECTOR AVILABLE
S253
RESET DETECTOR-SWITCH-DETERMINING COUNTER
S254
SET COUNT FLAG "OFF"
RETURN

FIG.24

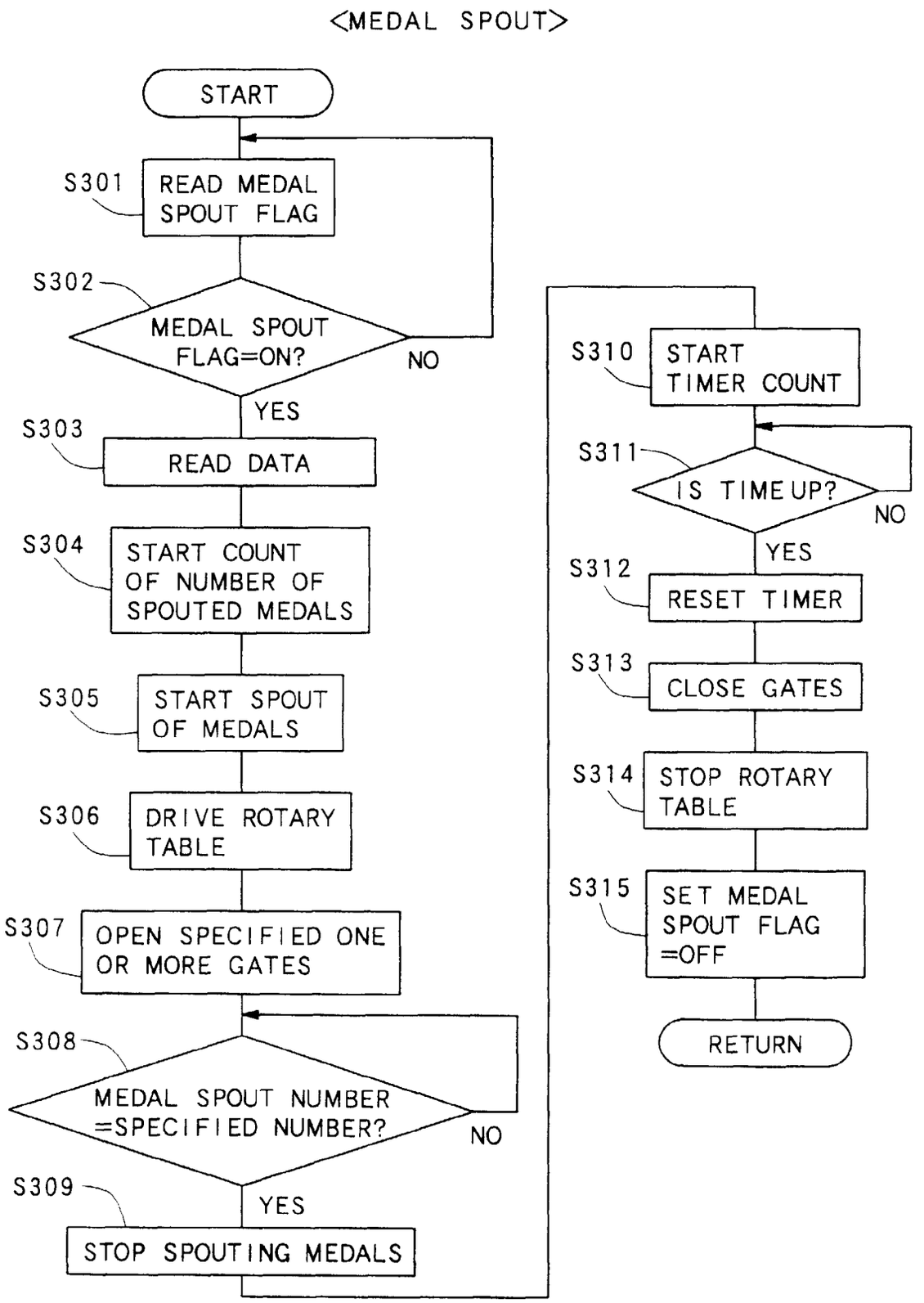
<MEDAL SPOUT>
START
S301
READ MEDAL SPOUT FLAG
S302
MEDAL SPOUT FLAG=ON?
NO
YES
S303
READ DATA
S304
START COUNT OF NUMBER OF SPOUTED MEDALS
S305
START SPOUT OF MEDALS
S306
DRIVE ROTARY TABLE
S307
OPEN SPECIFIED ONE OR MORE GATES
S308
MEDAL SPOUT NUMBER =SPECIFIED NUMBER?
NO
S309
YES
STOP SPOUTING MEDALS
S310
START TIMER COUNT
S311
IS TIME UP?
NO
YES
S312
RESET TIMER
S313
CLOSE GATES
S314
STOP ROTARY TABLE
S315
SET MEDAL SPOUT FLAG =OFF
RETURN

FIG.25

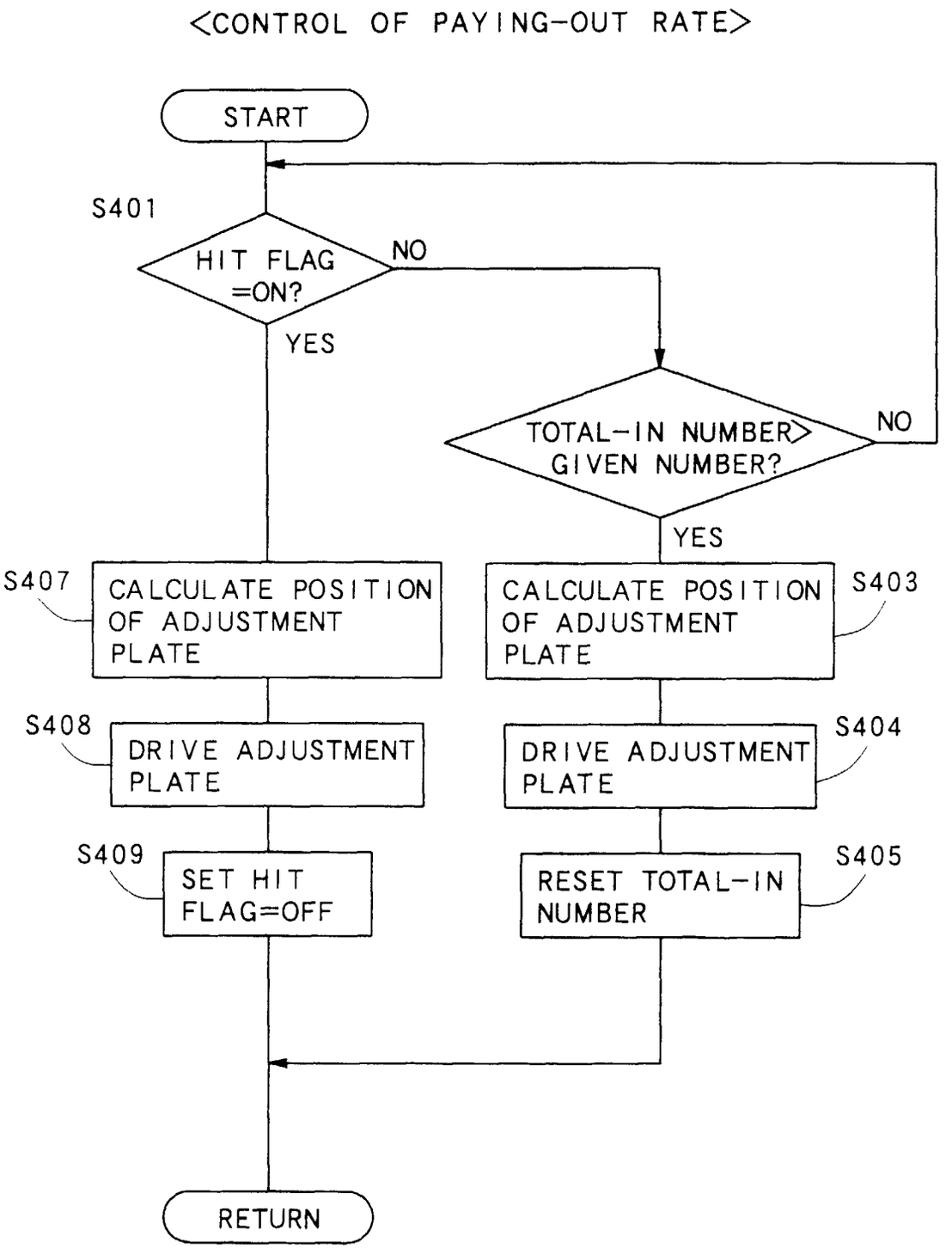
<CONTROL OF PAYING-OUT RATE>
START
S401
HIT FLAG =ON?
NO
YES
TOTAL-IN NUMBER> GIVEN NUMBER?
NO
YES
S407
CALCULATE POSITION OF ADJUSTMENT PLATE
S403
CALCULATE POSITION OF ADJUSTMENT PLATE
S408
DRIVE ADJUSTMENT PLATE
S404
DRIVE ADJUSTMENT PLATE
S409
SET HIT FLAG=OFF
S405
RESET TOTAL-IN NUMBER
RETURN

FIG. 26