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(54) **POSITION ADJUSTING METHOD AND APPARATUS FOR ADJUSTMENT TARGET PORTION IN SHEET PROCESSING MACHINE**

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(57) **ABSTRACT**

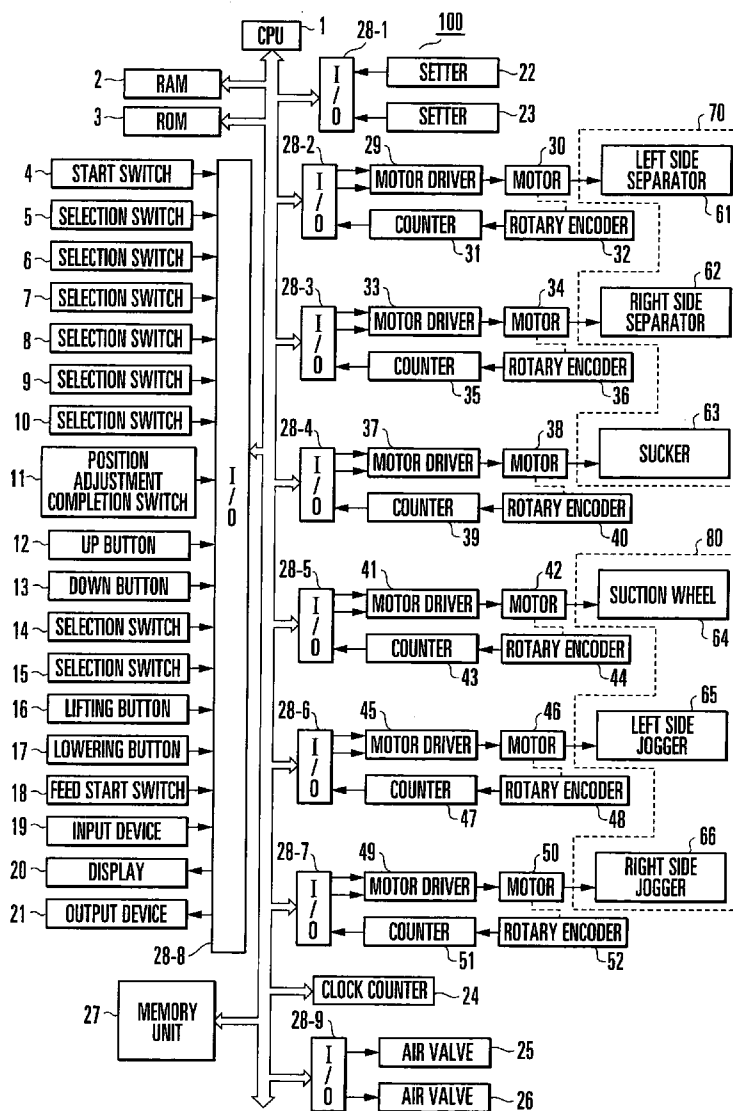
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In a position adjusting method for an adjustment target portion in a sheet processing machine including a pile board which is lifted and lowered with a sheet stacked thereon, and the adjustment target portion a position of which is adjusted in accordance with a size of the sheet on the pile board, the pile board is lifted with the sheet stacked thereon, and the adjustment target portion is moved in a direction to further separate from a center of the sheet on the pile board as the pile board is lifted. A position adjusting apparatus is also disclosed.

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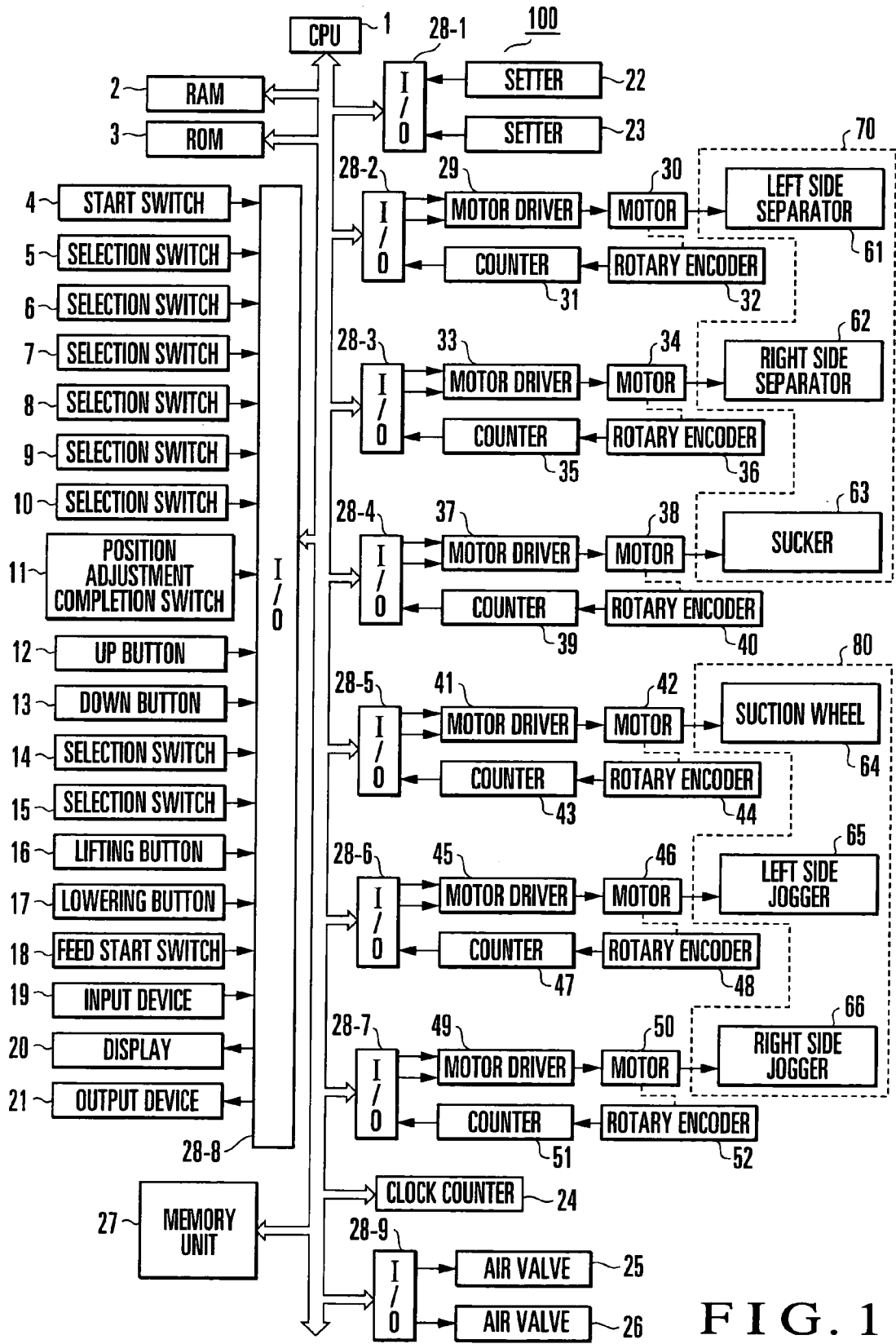


FIG. 1

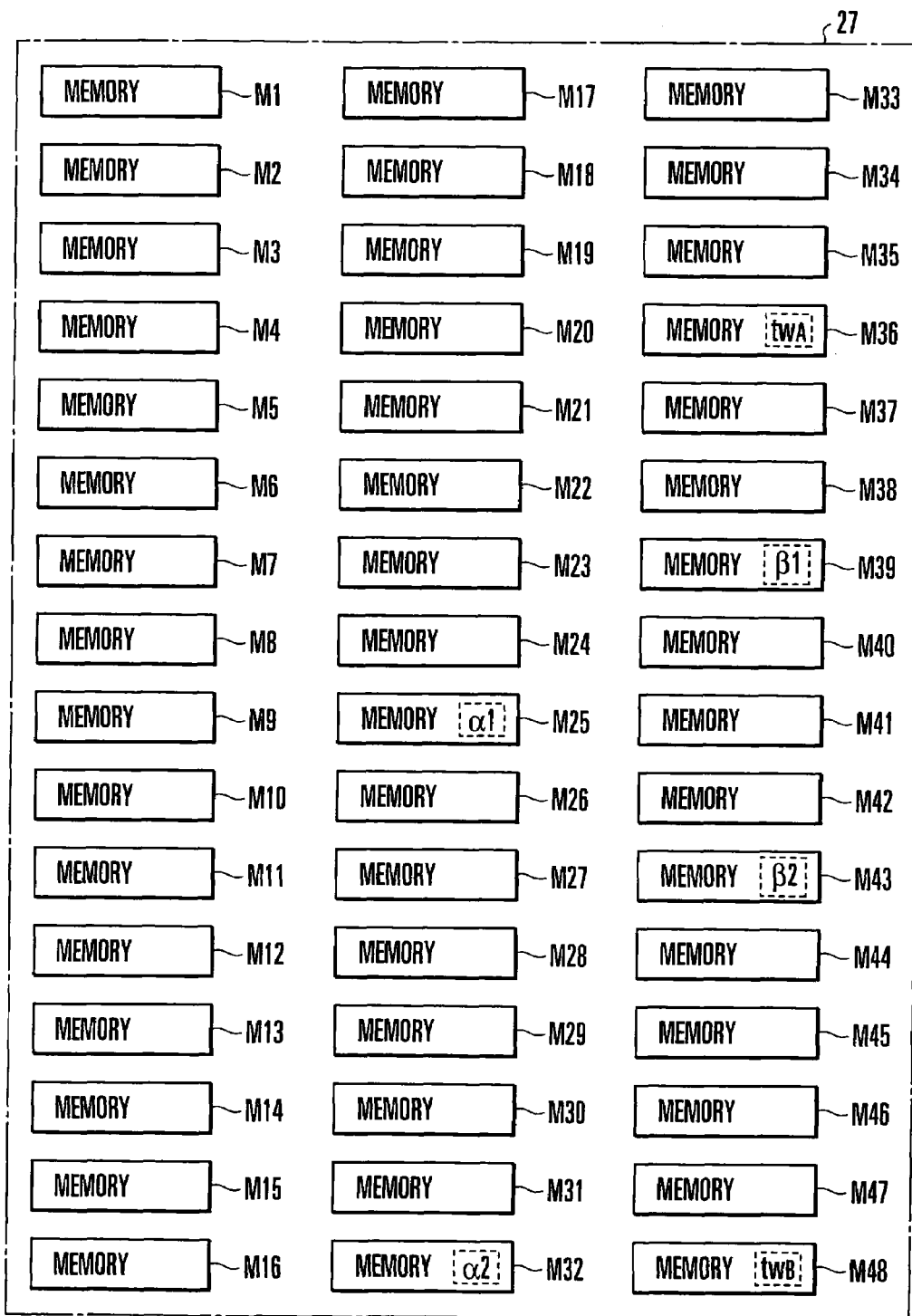


FIG. 2

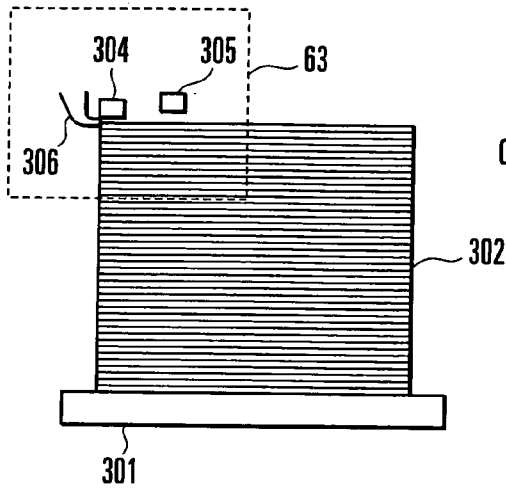


FIG. 3A

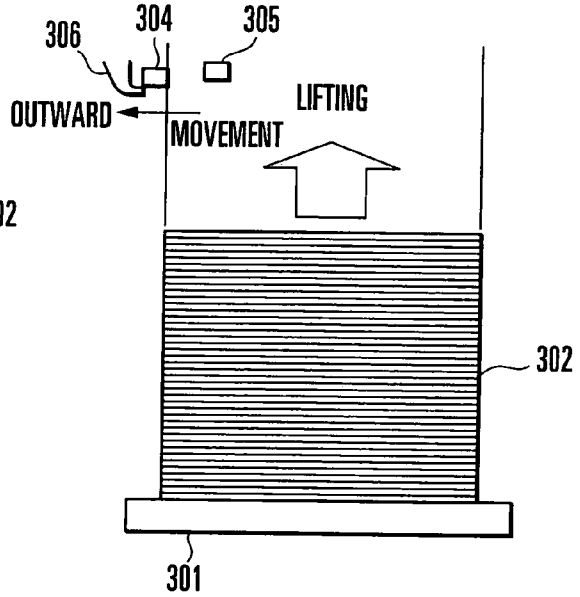


FIG. 3C

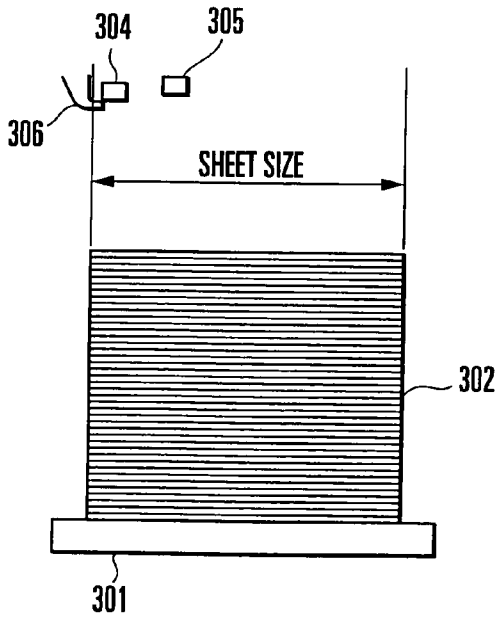


FIG. 3B

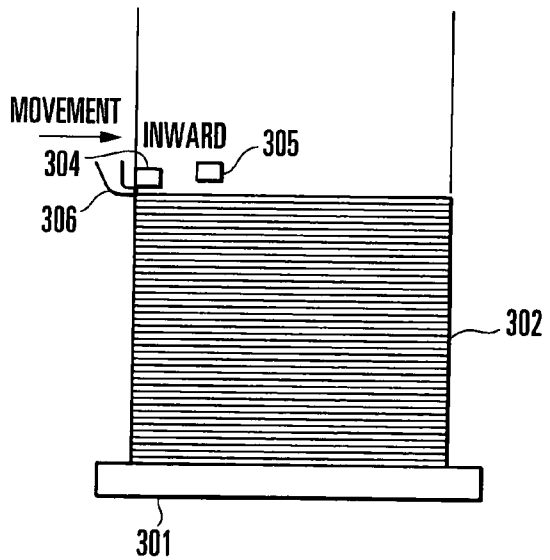


FIG. 3D

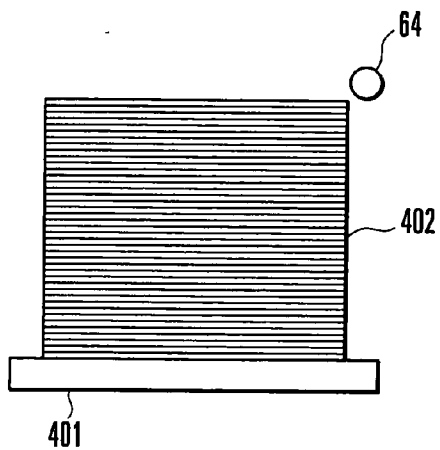


FIG. 4A

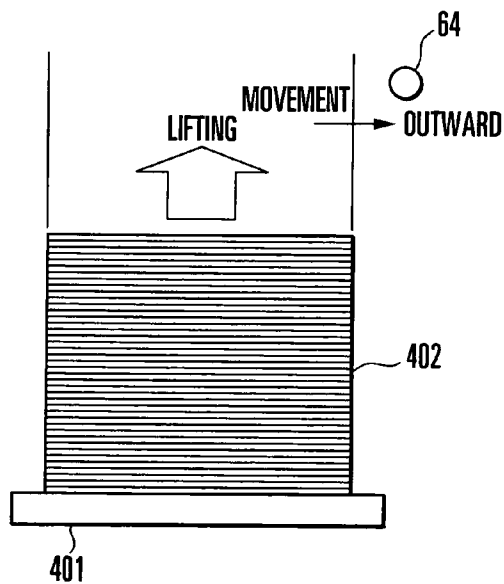


FIG. 4C

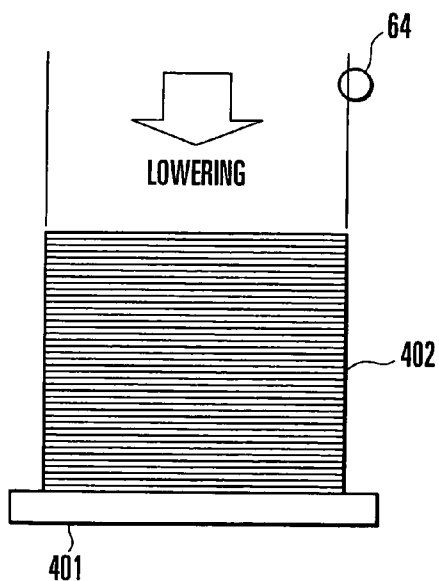


FIG. 4B

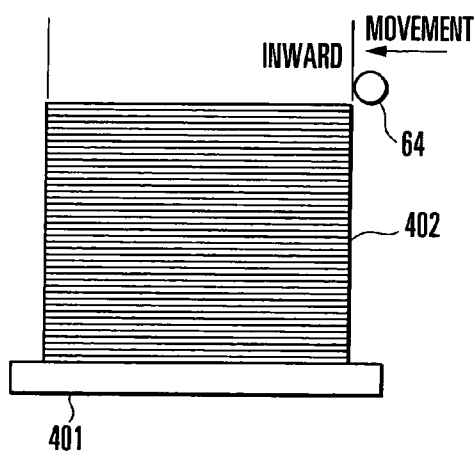


FIG. 4D

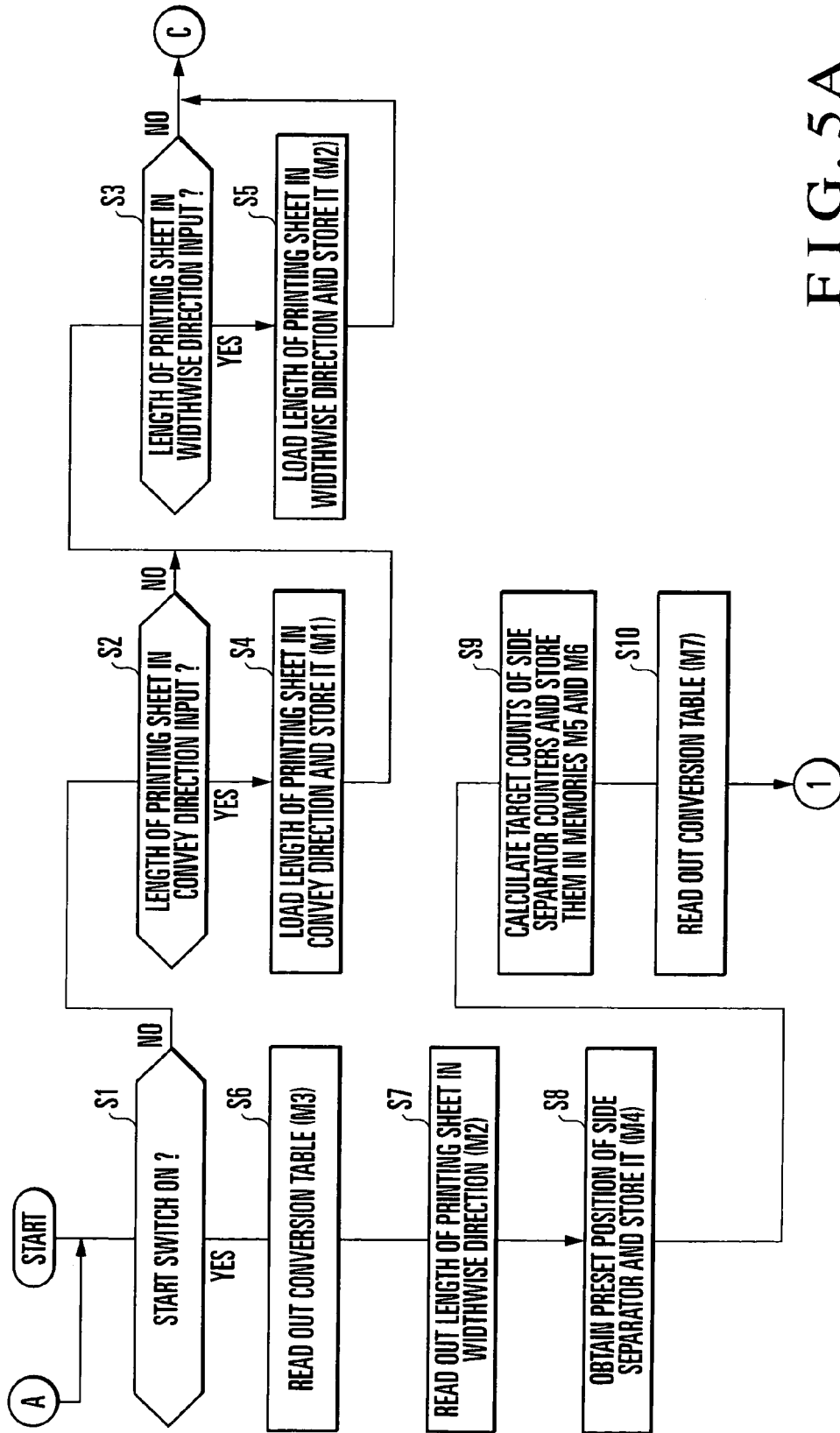


FIG. 5A

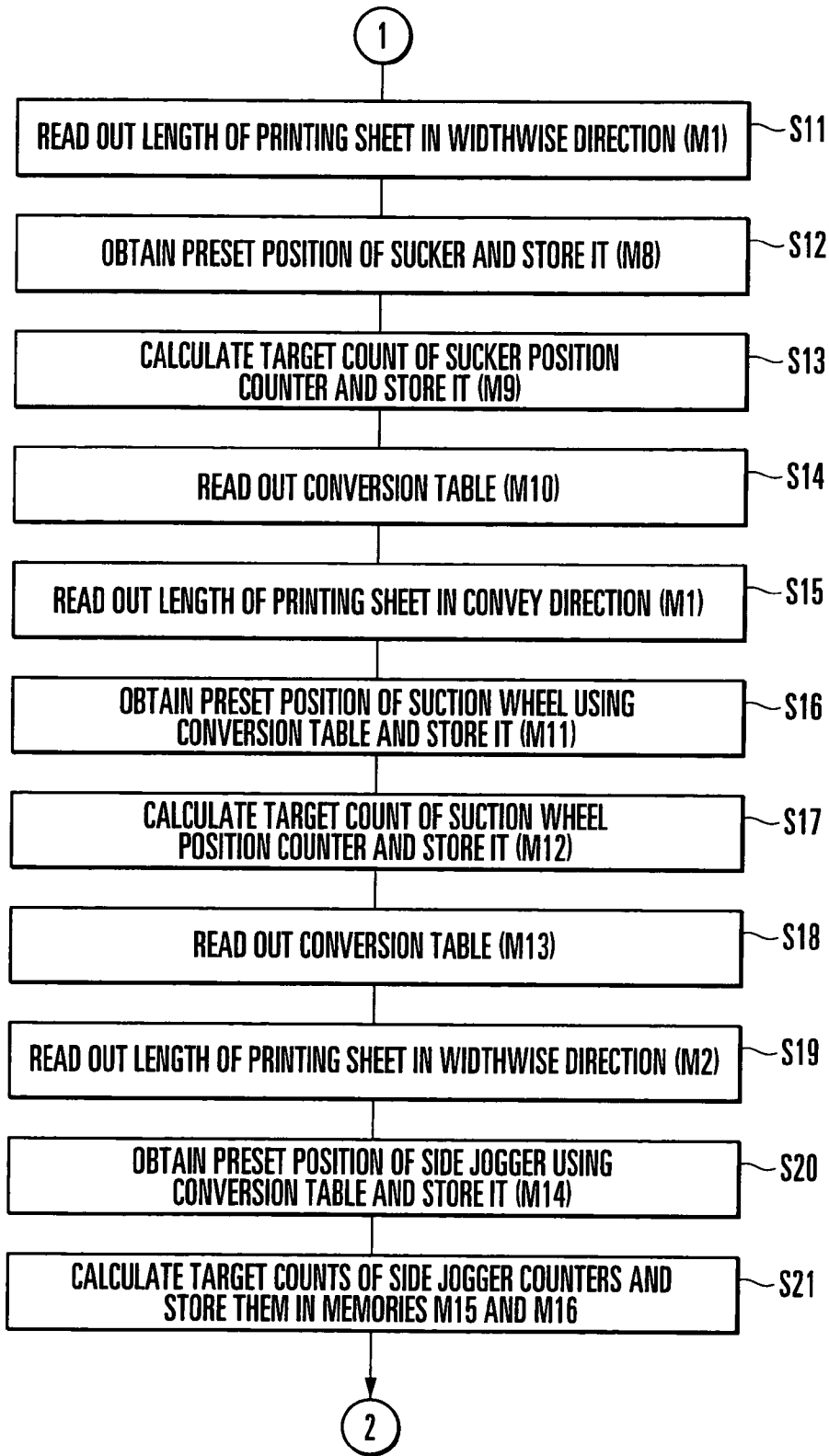


FIG. 5B

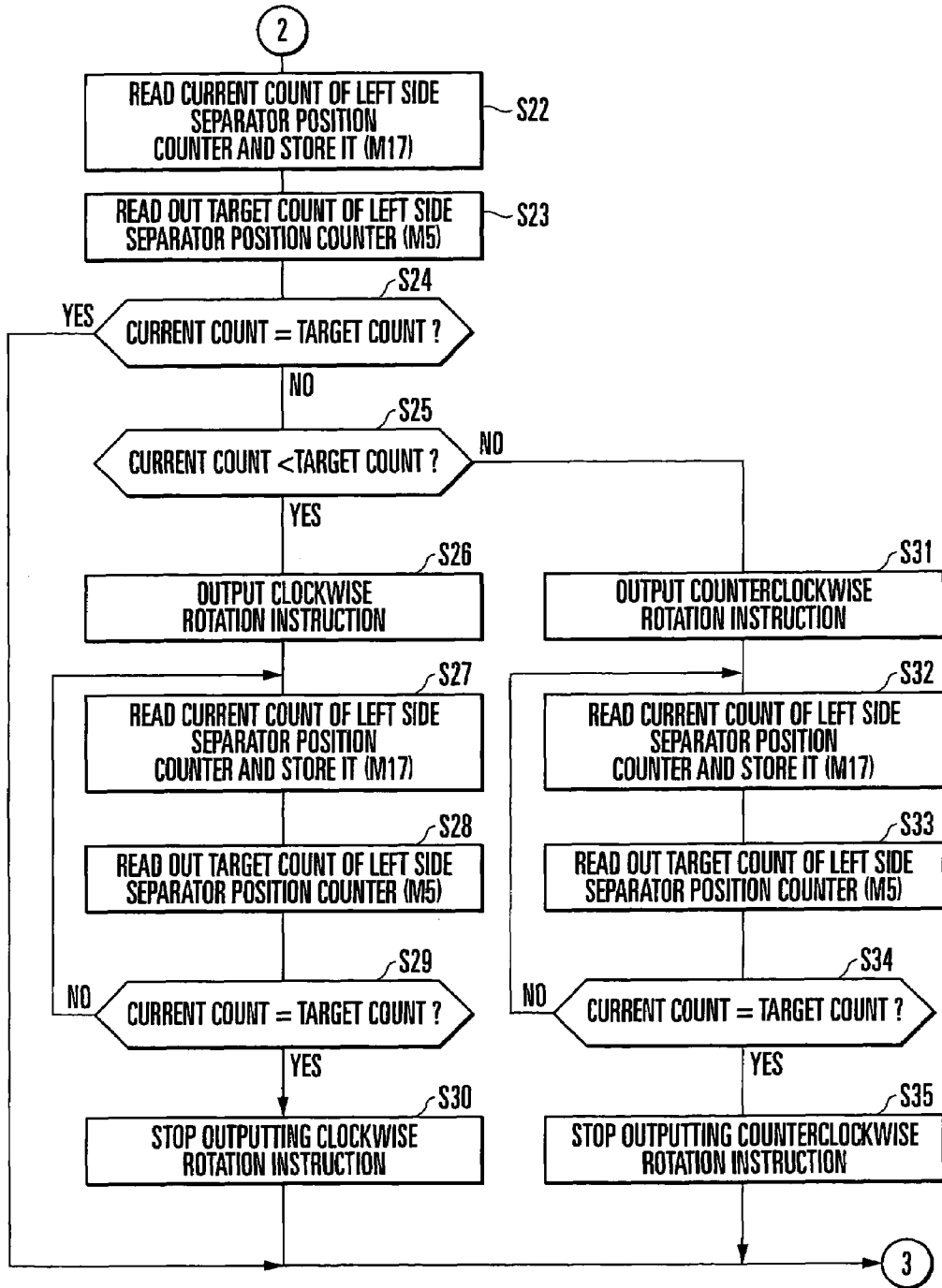


FIG. 5C

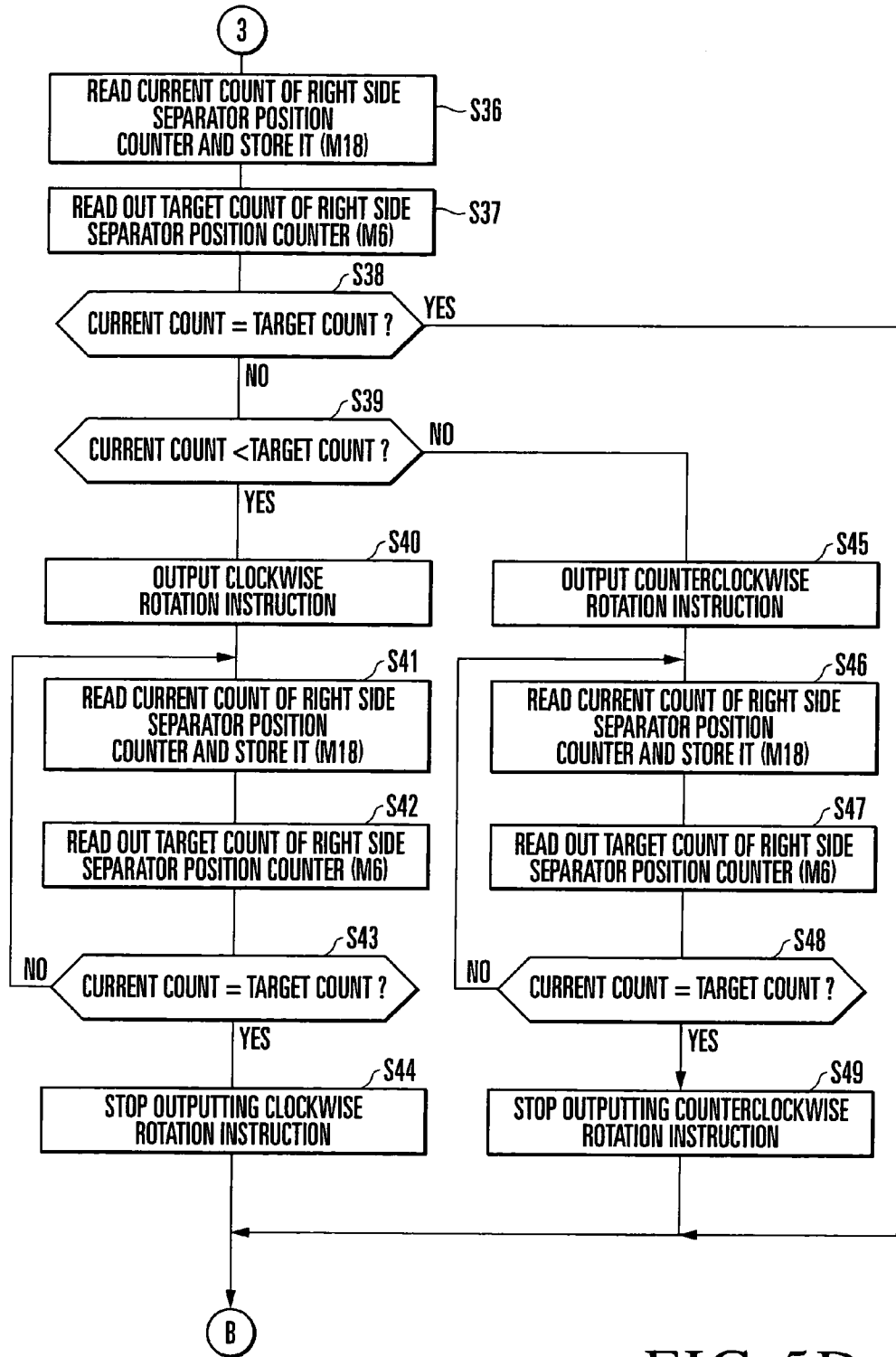


FIG. 5D

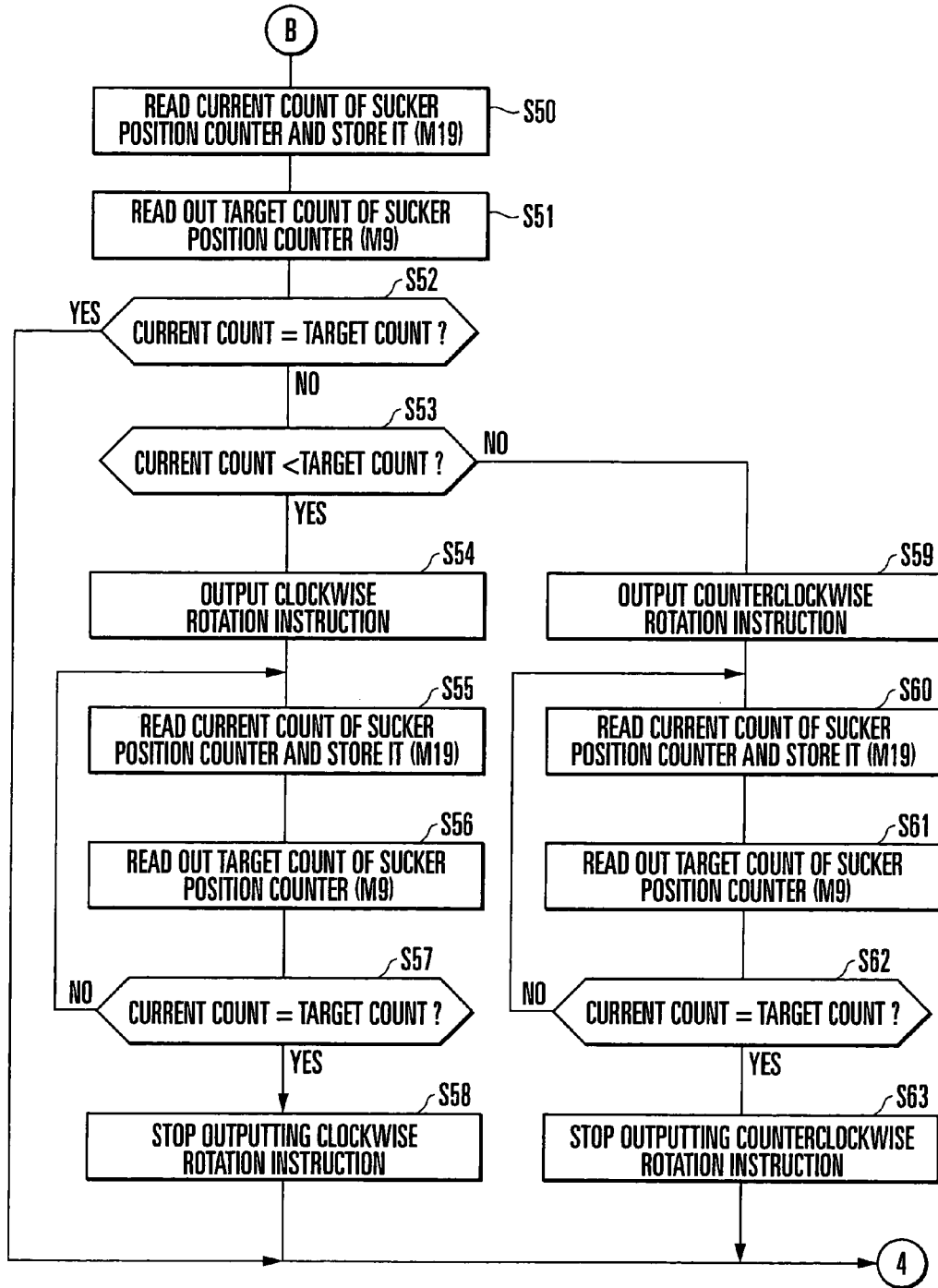


FIG. 5E

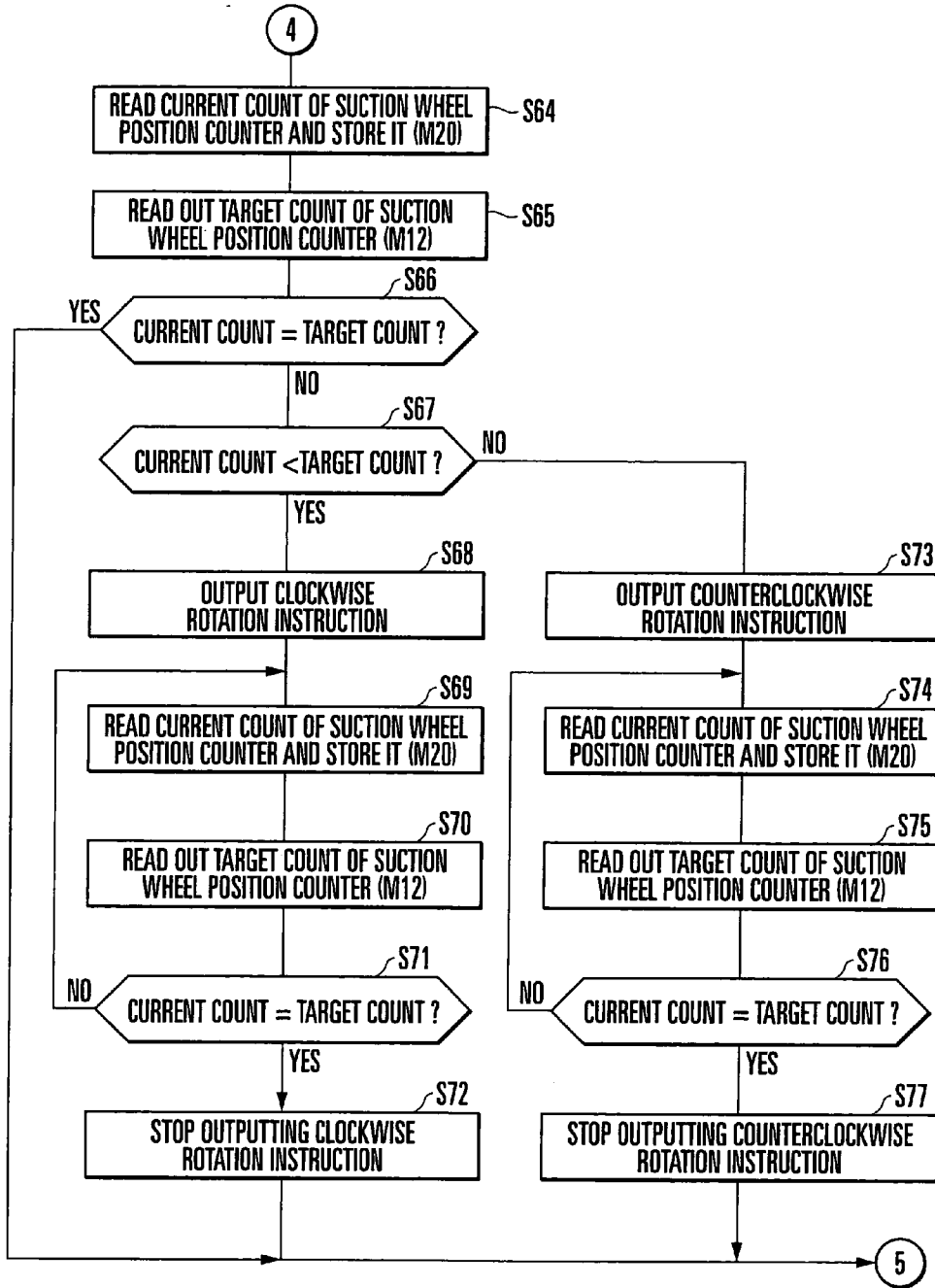


FIG. 5F

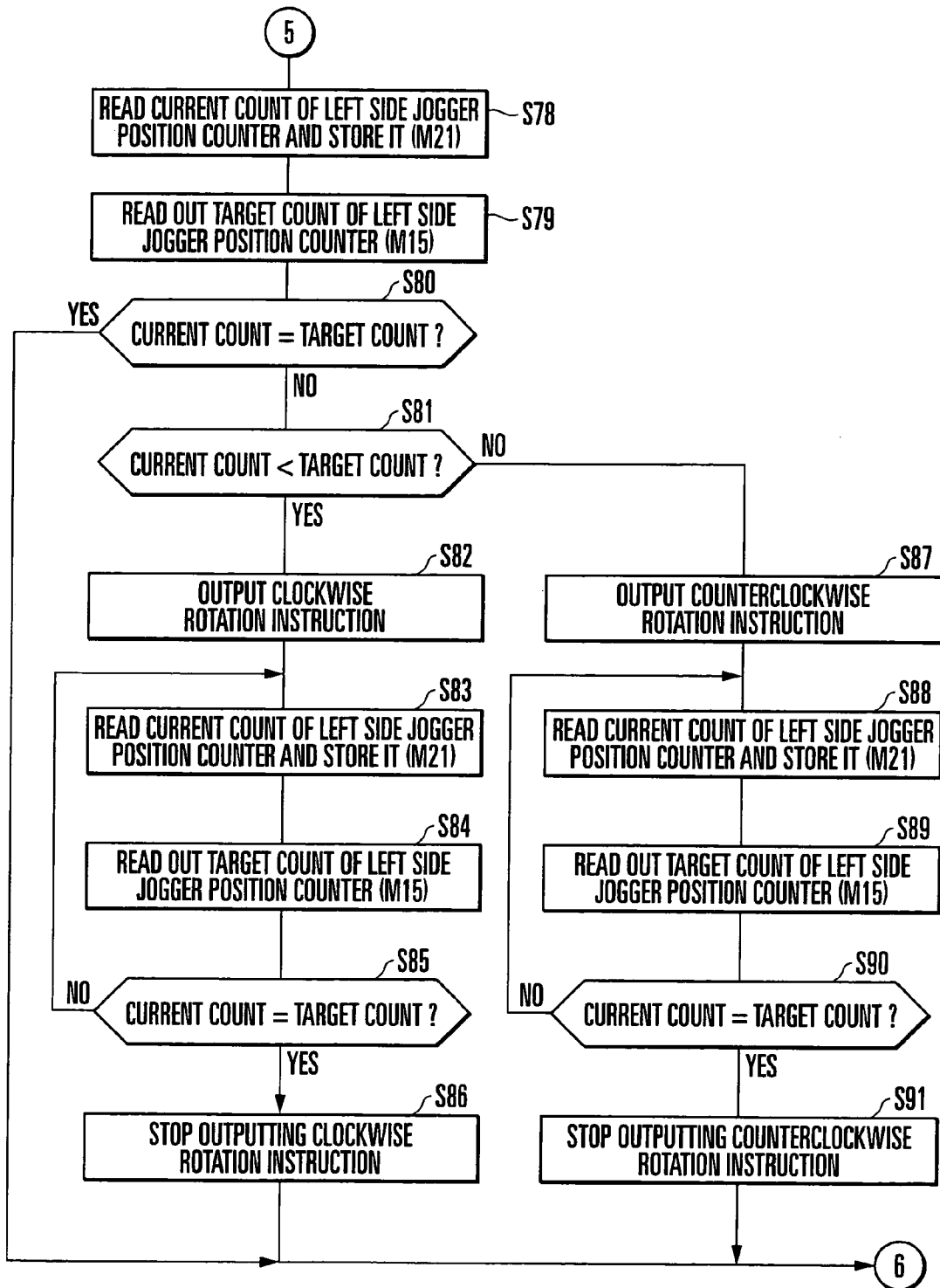


FIG. 5G

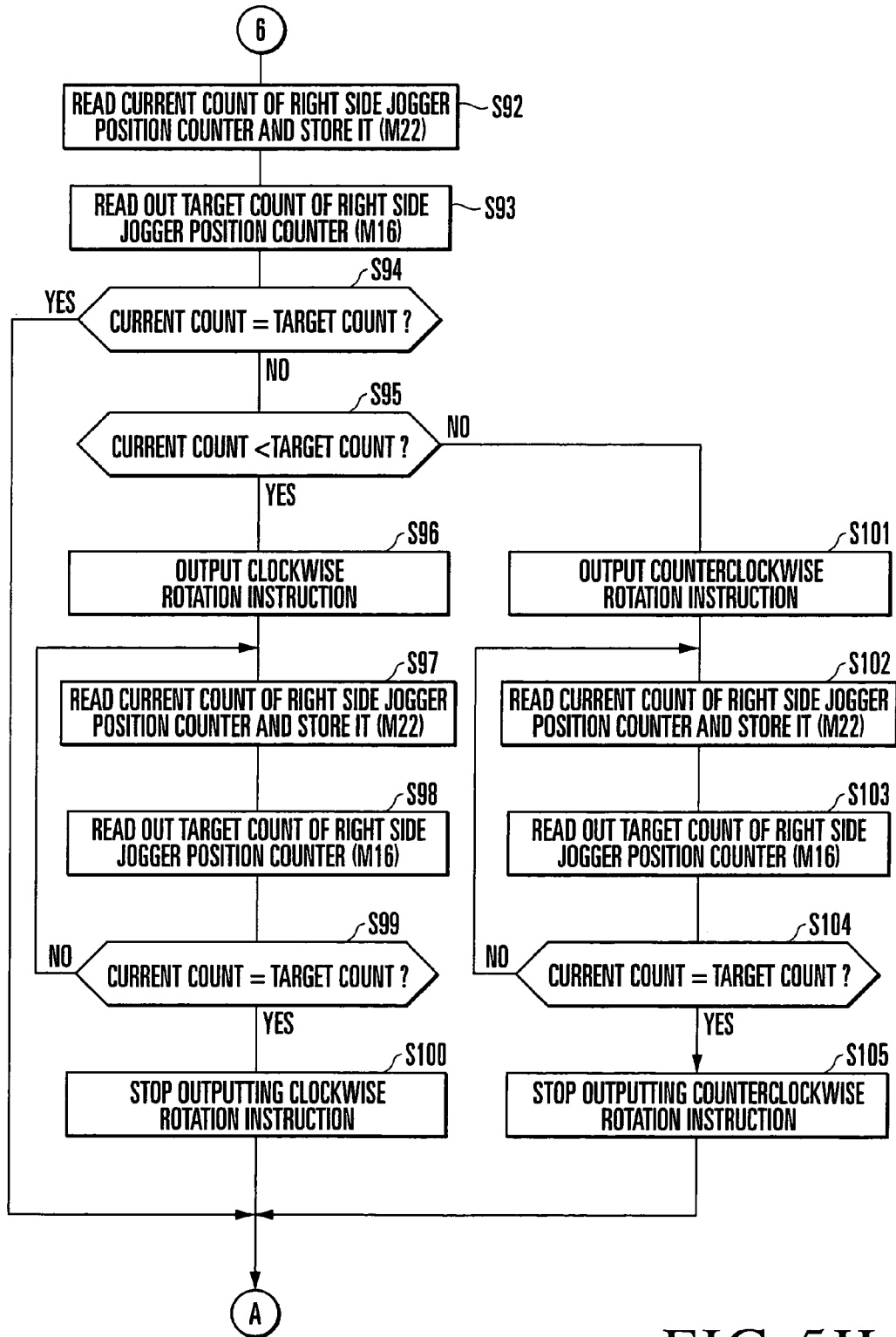


FIG. 5H

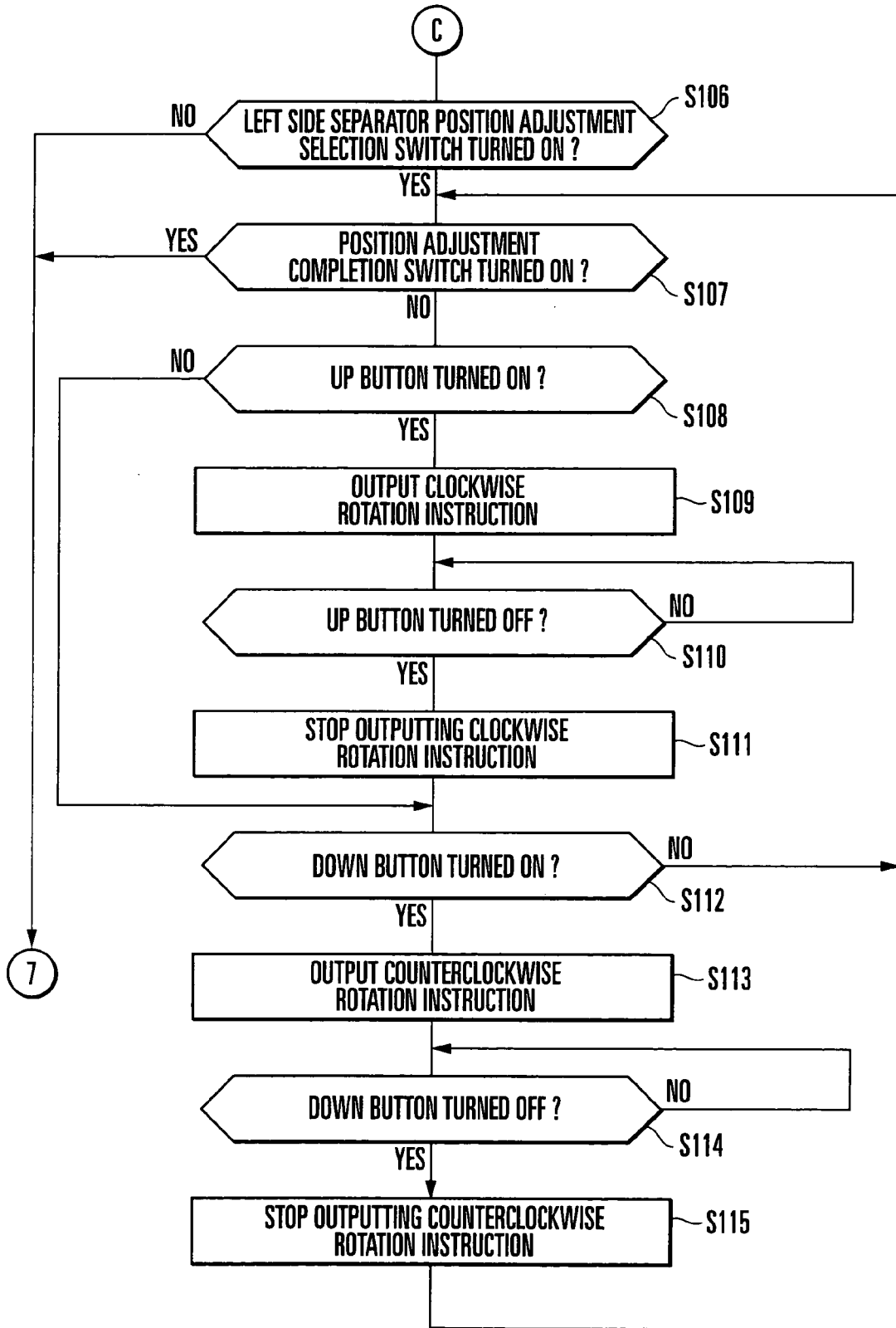


FIG. 5I

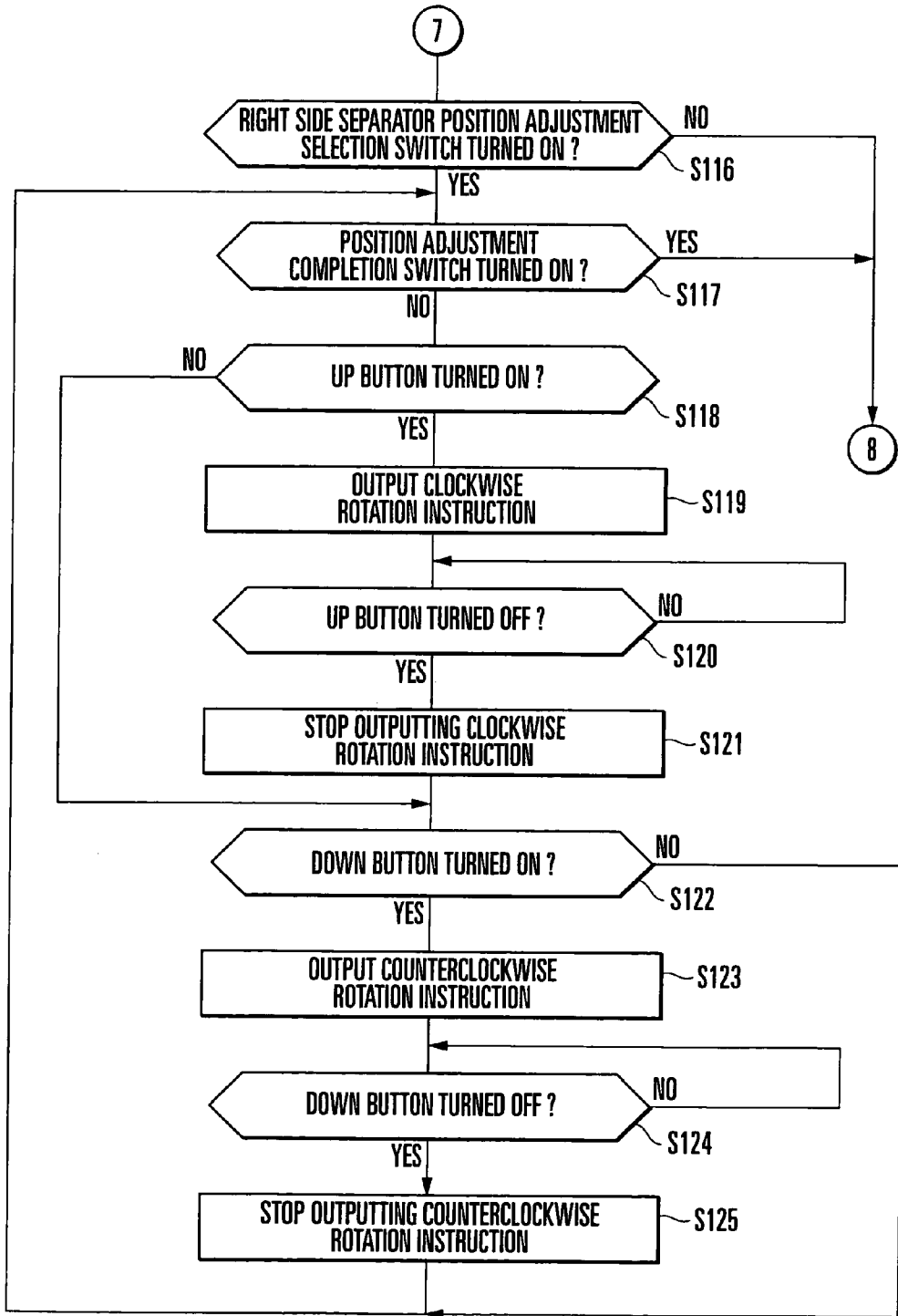


FIG.5J

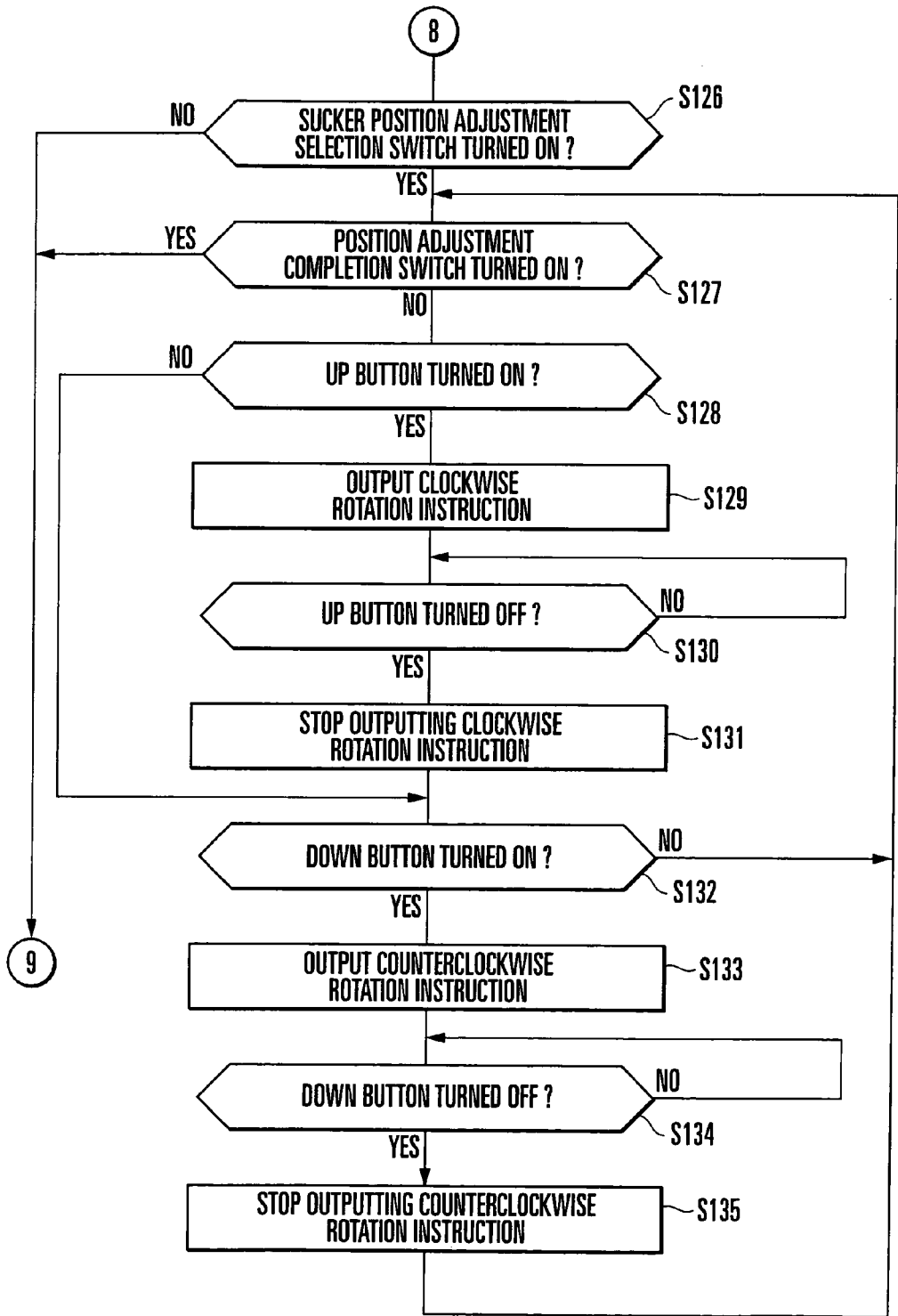


FIG. 5K

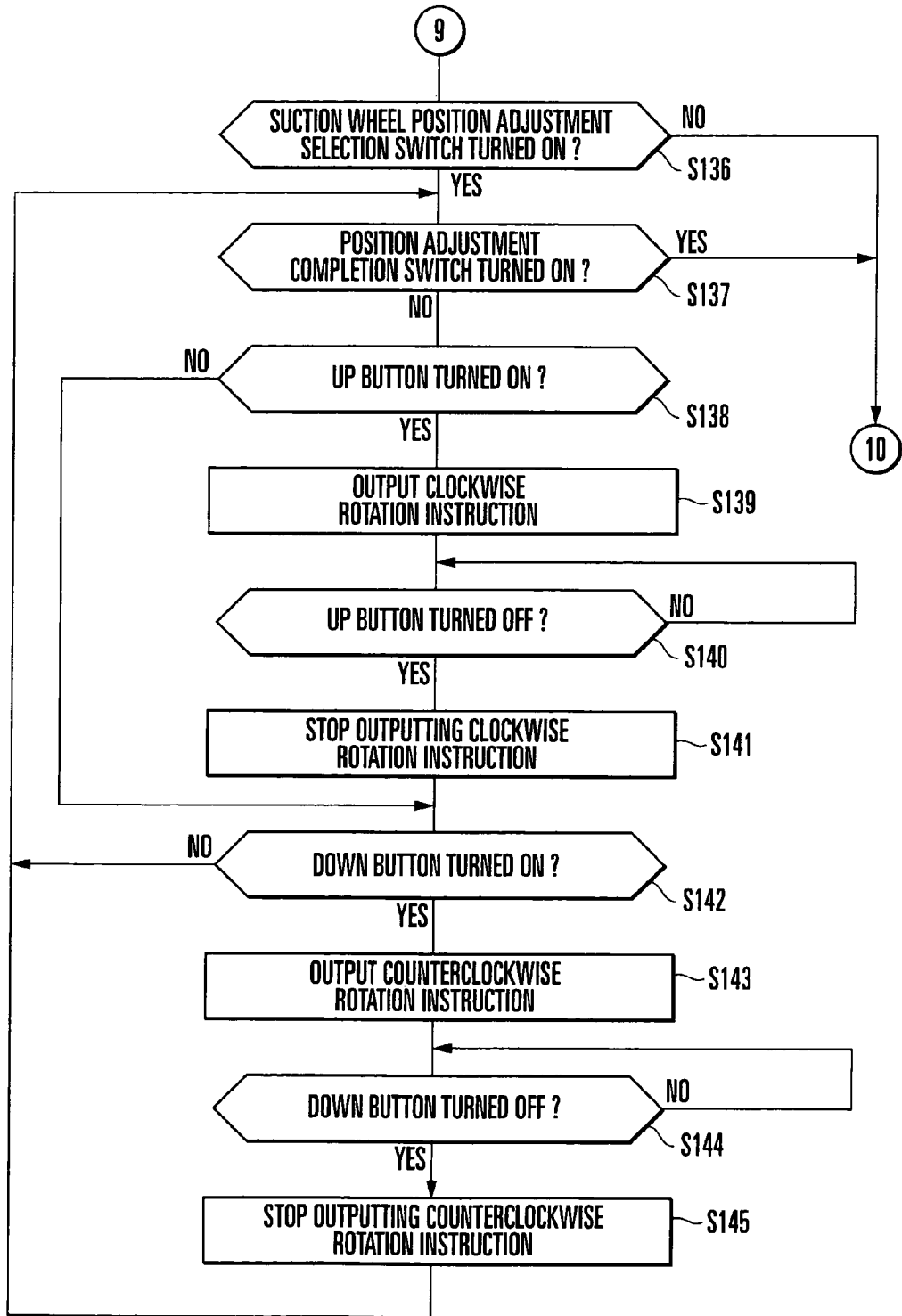


FIG. 5L

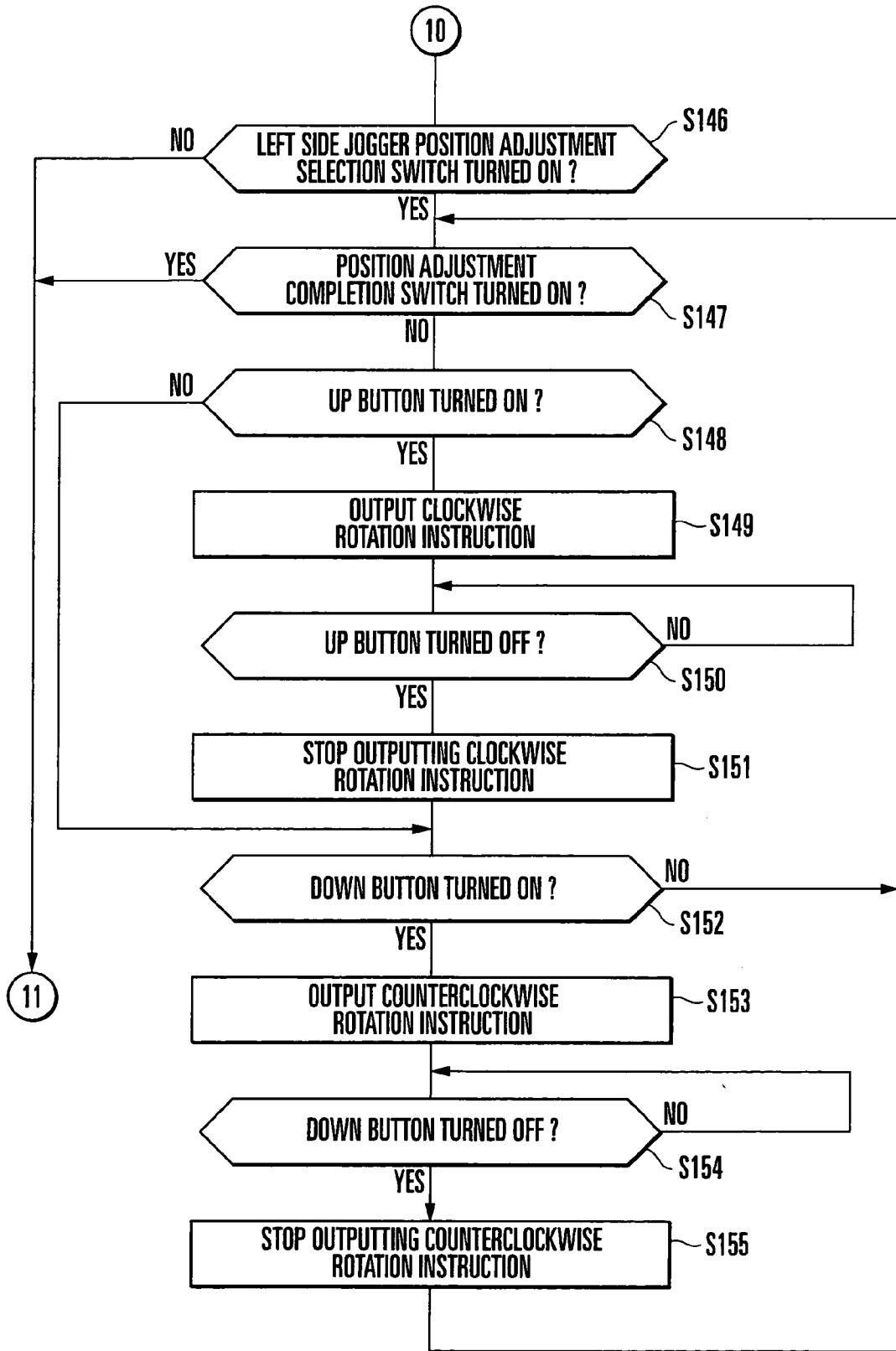


FIG. 5M

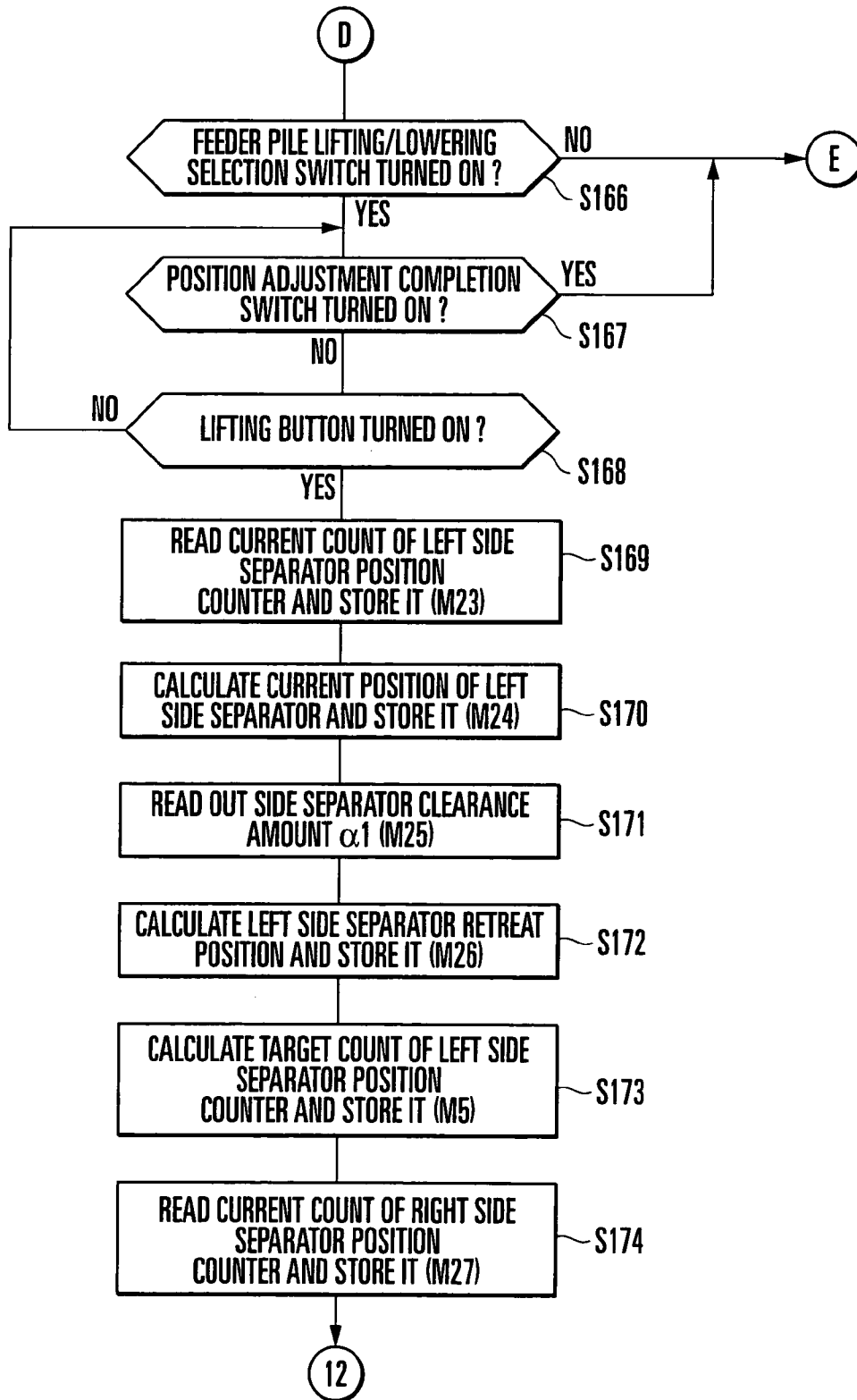


FIG. 50

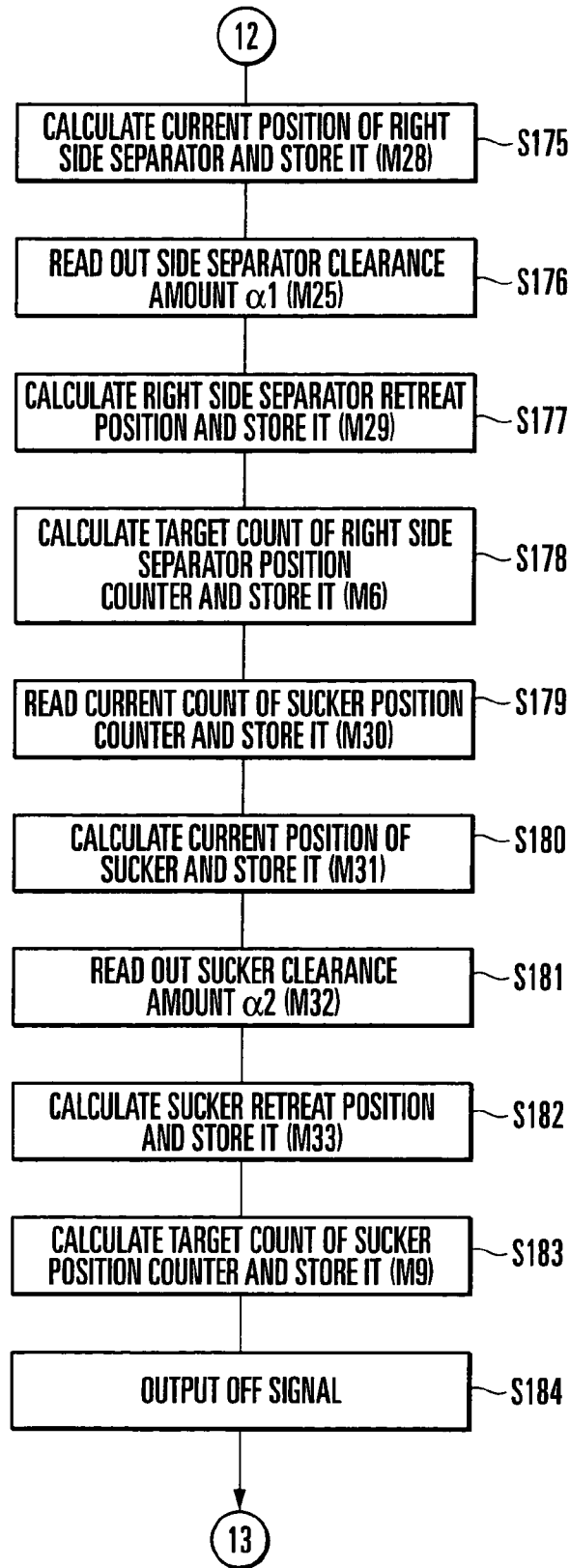


FIG.5P

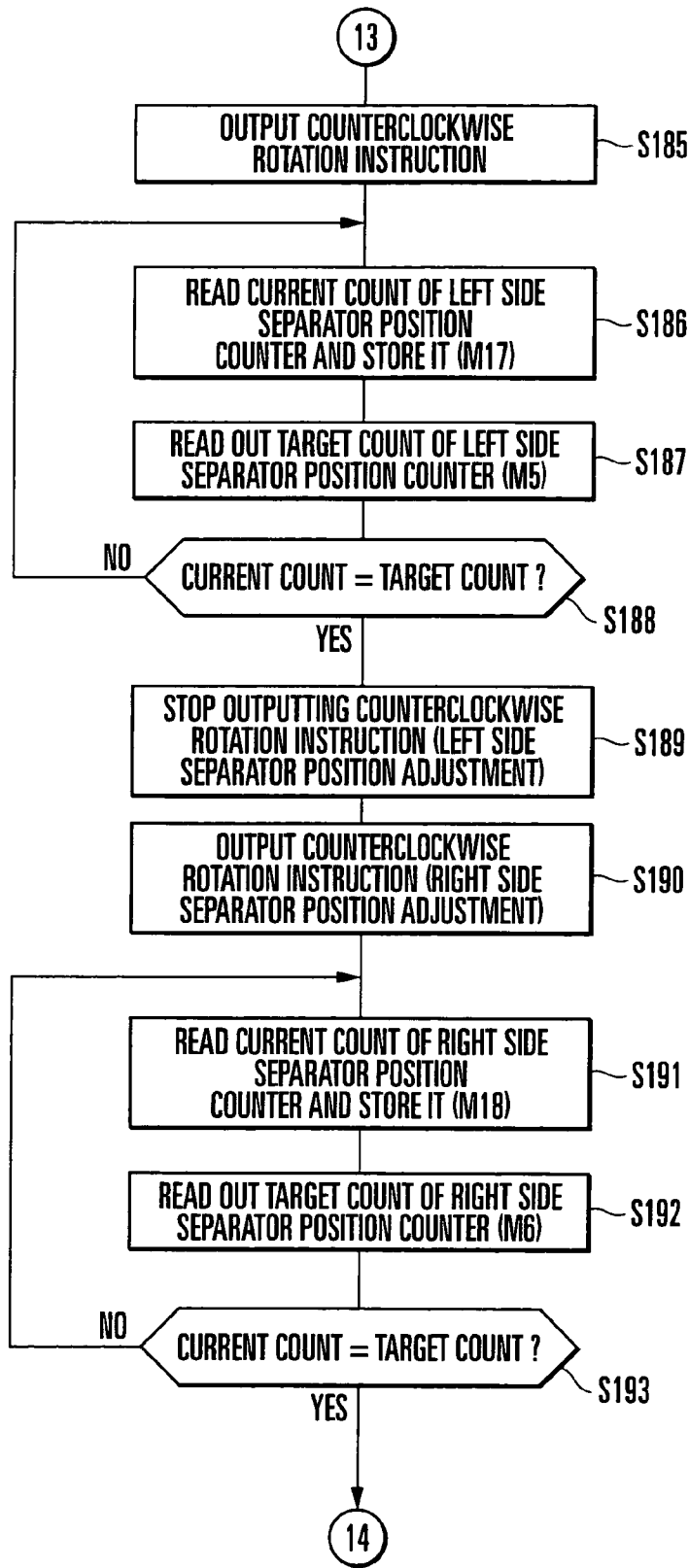


FIG. 5Q

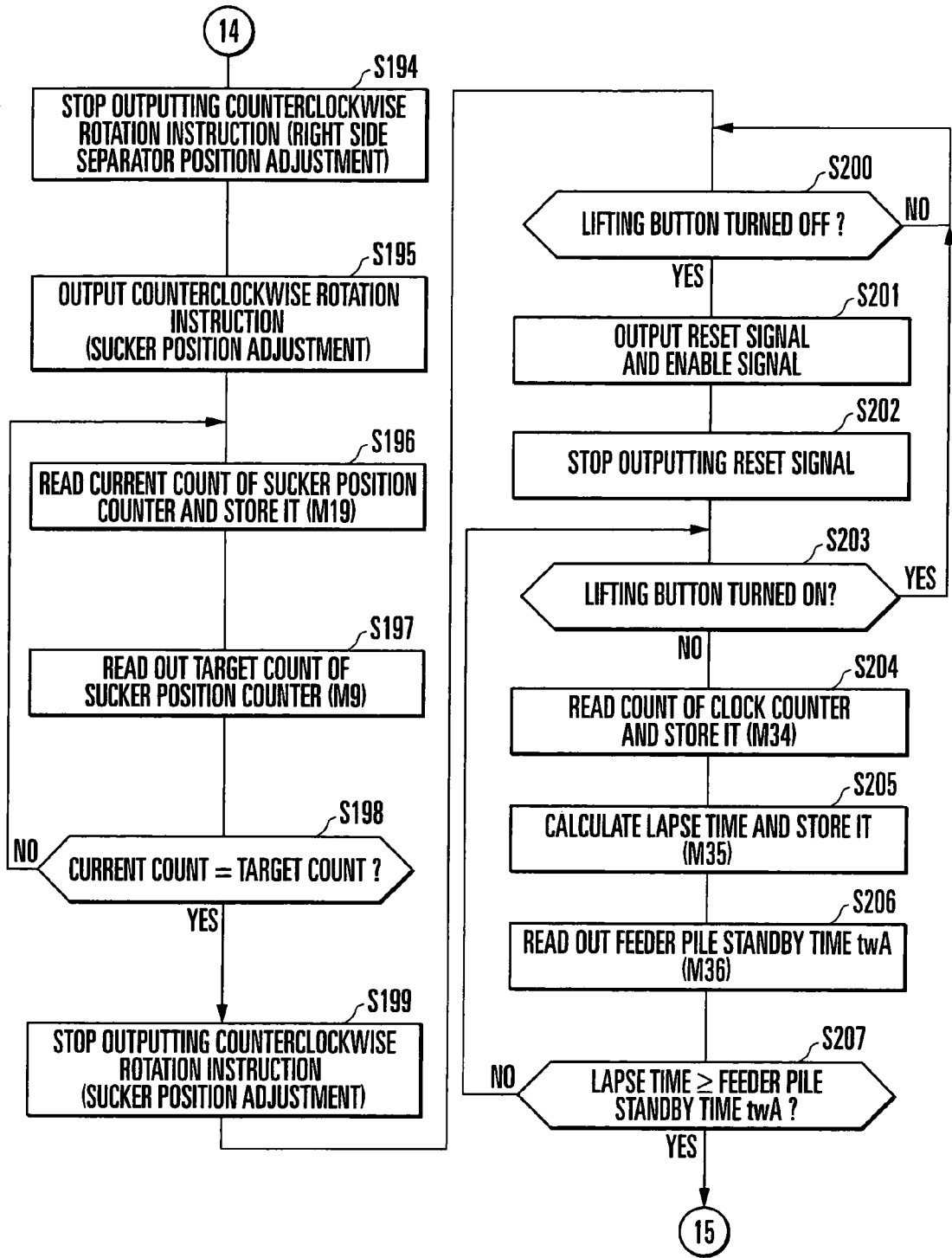


FIG. 5R

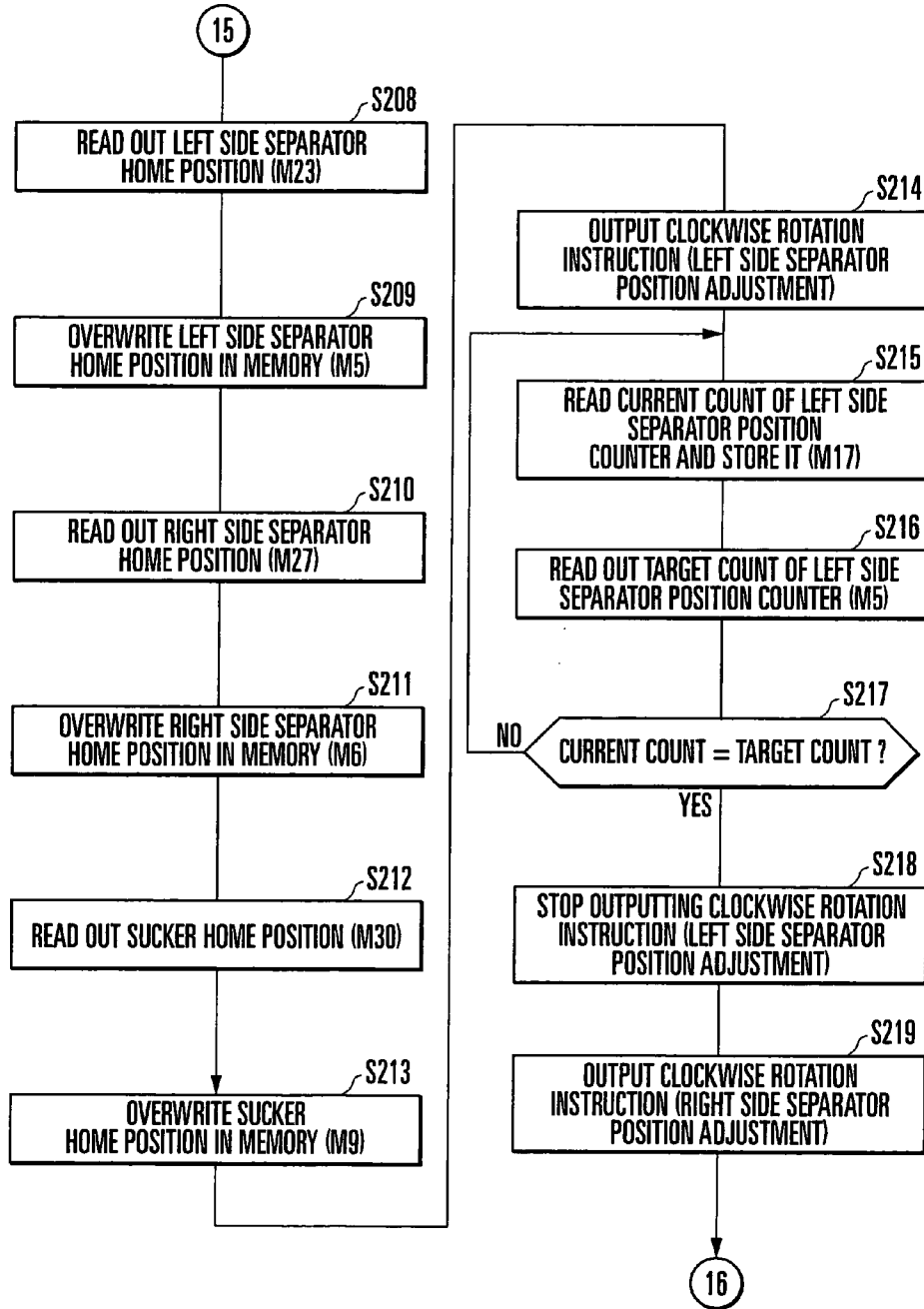


FIG. 5S

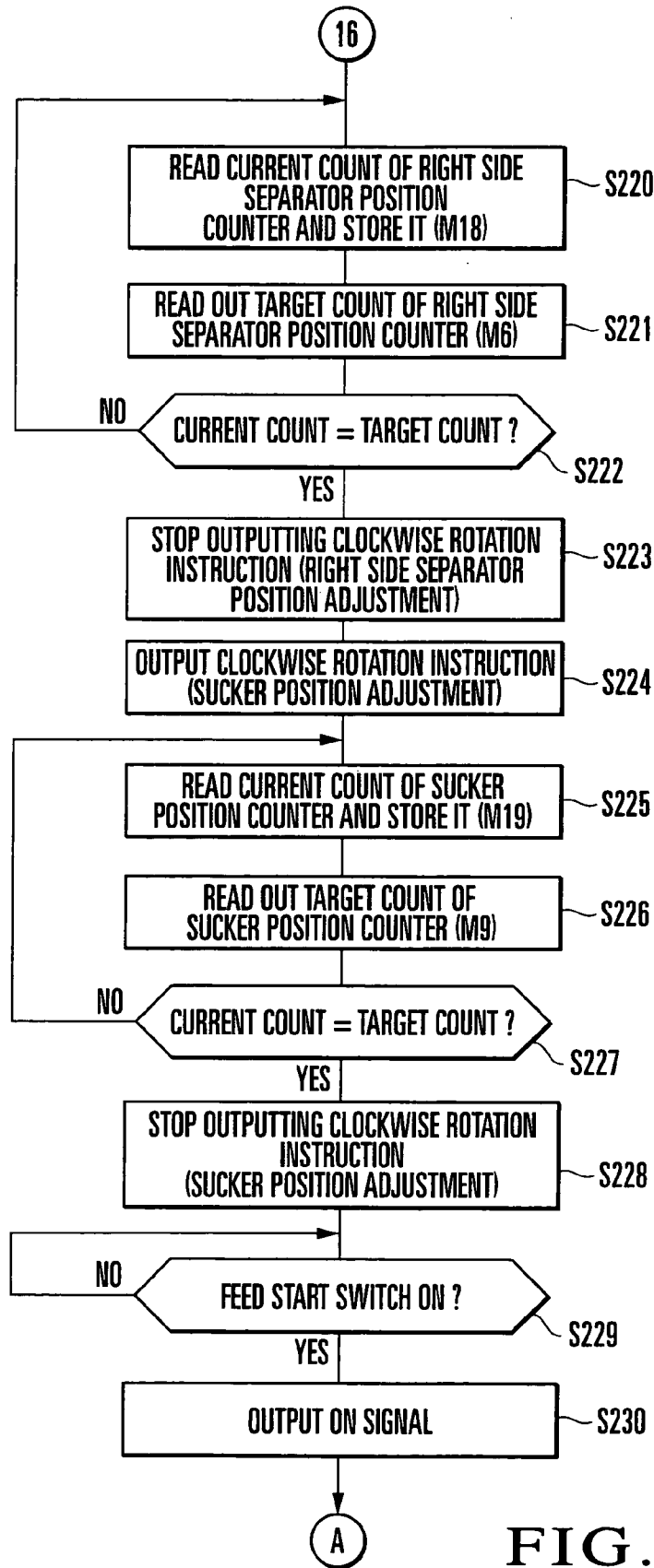


FIG.5T

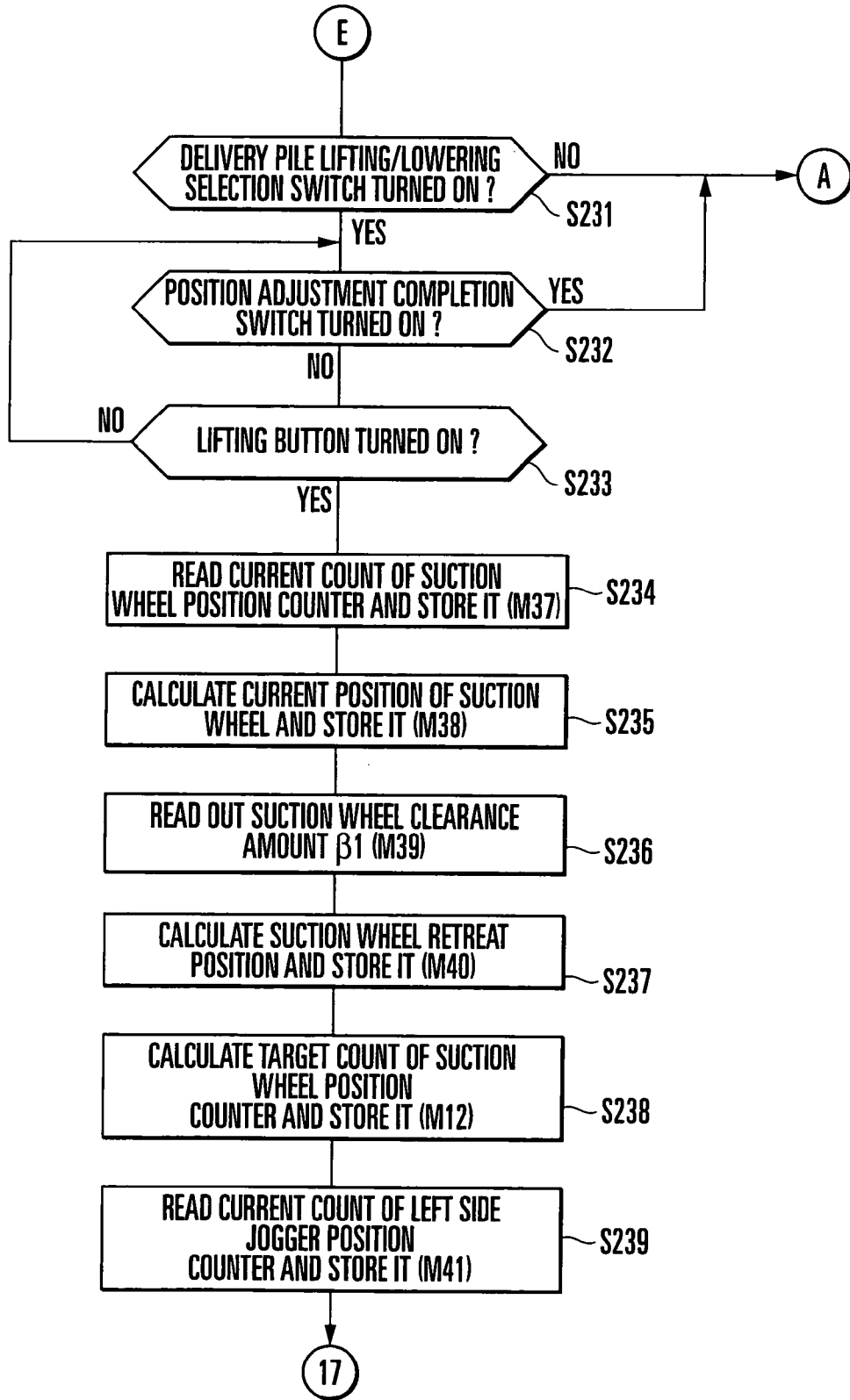


FIG. 5U

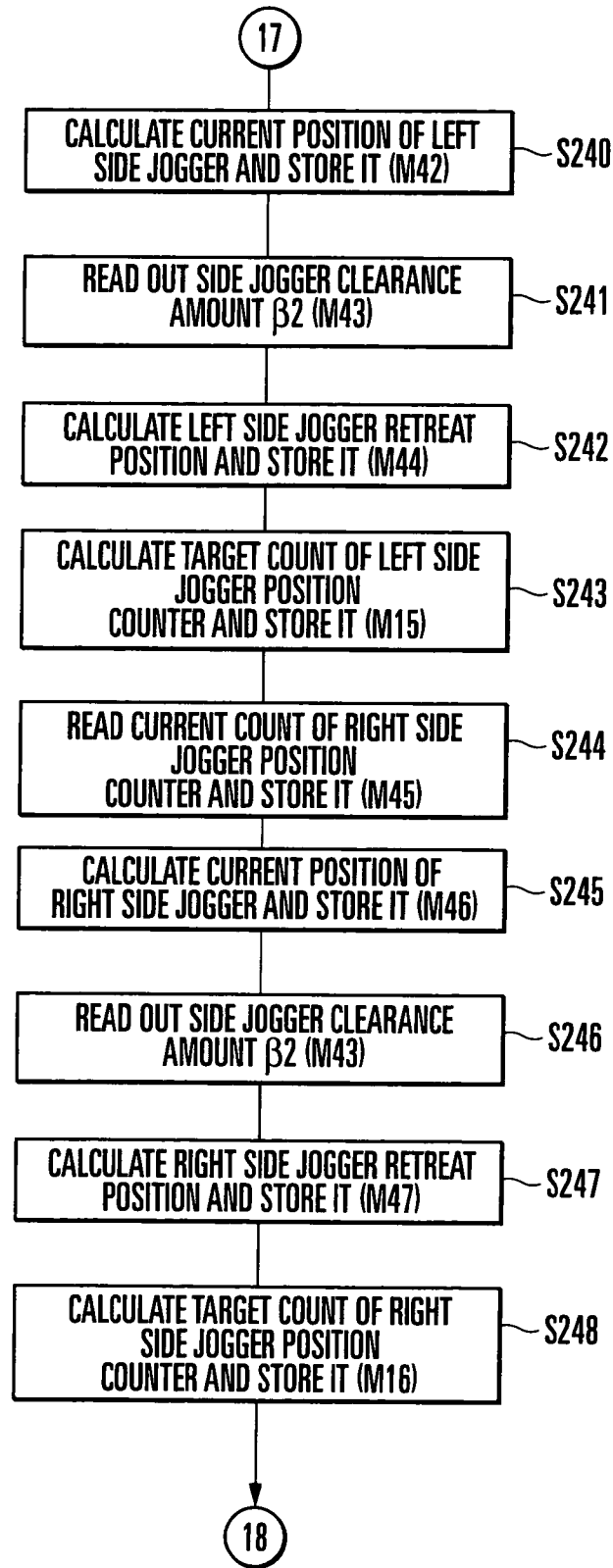


FIG. 5V

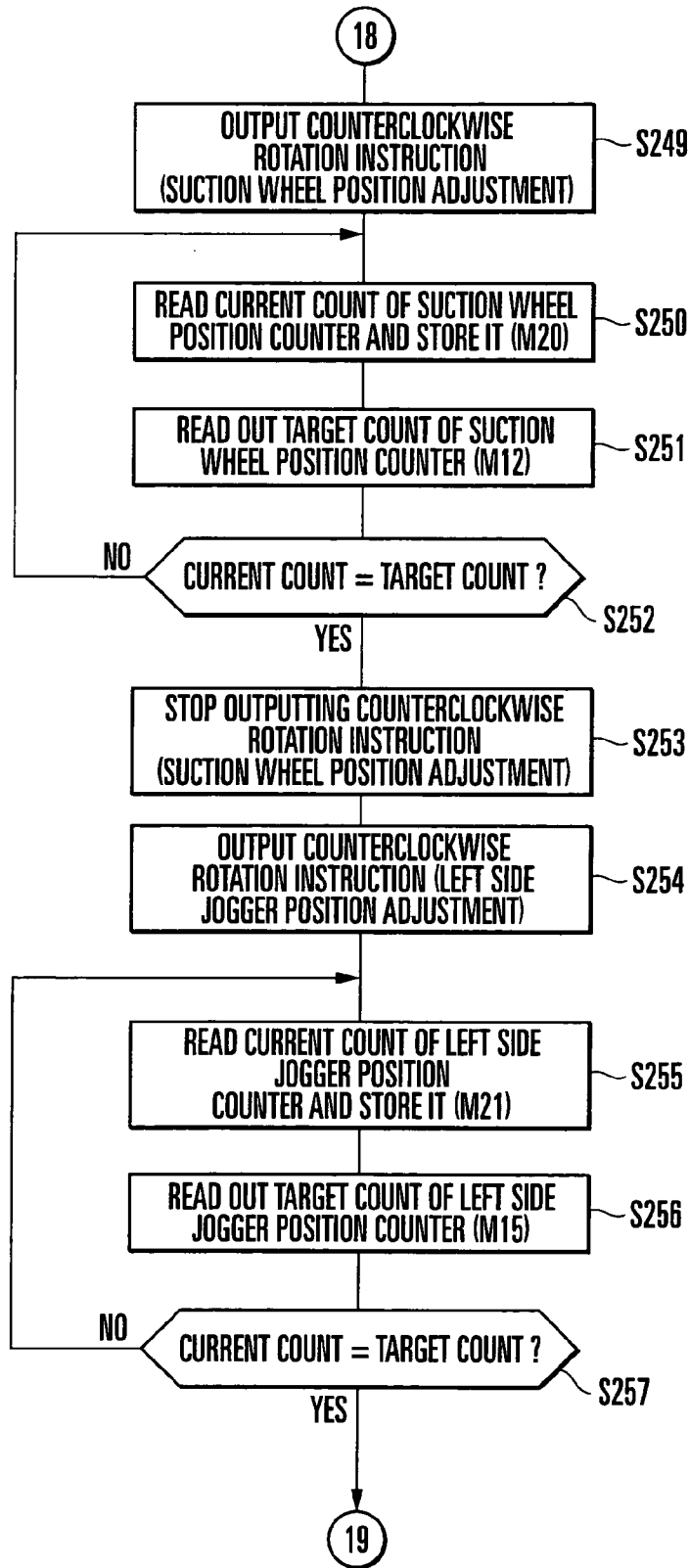


FIG. 5W

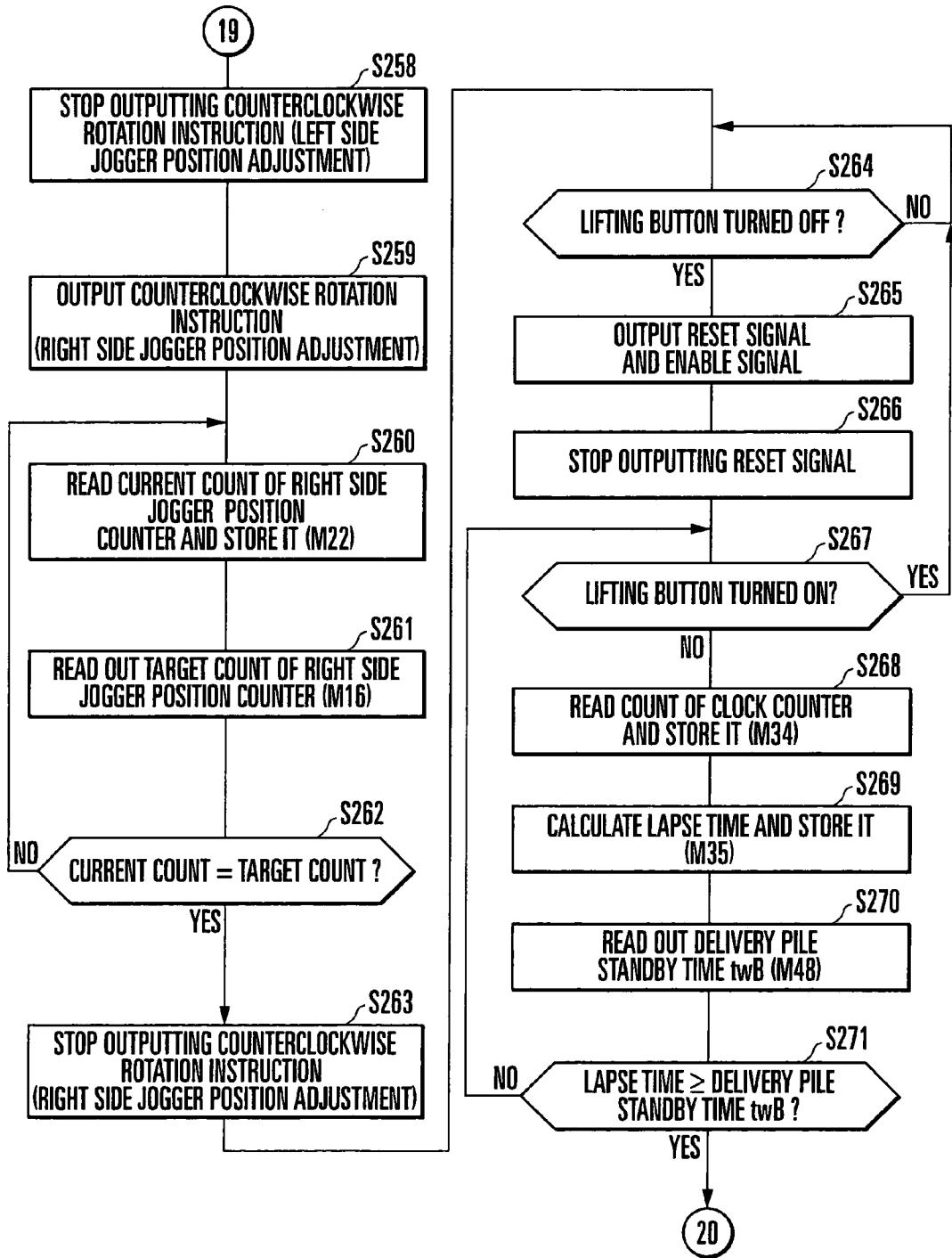


FIG. 5X

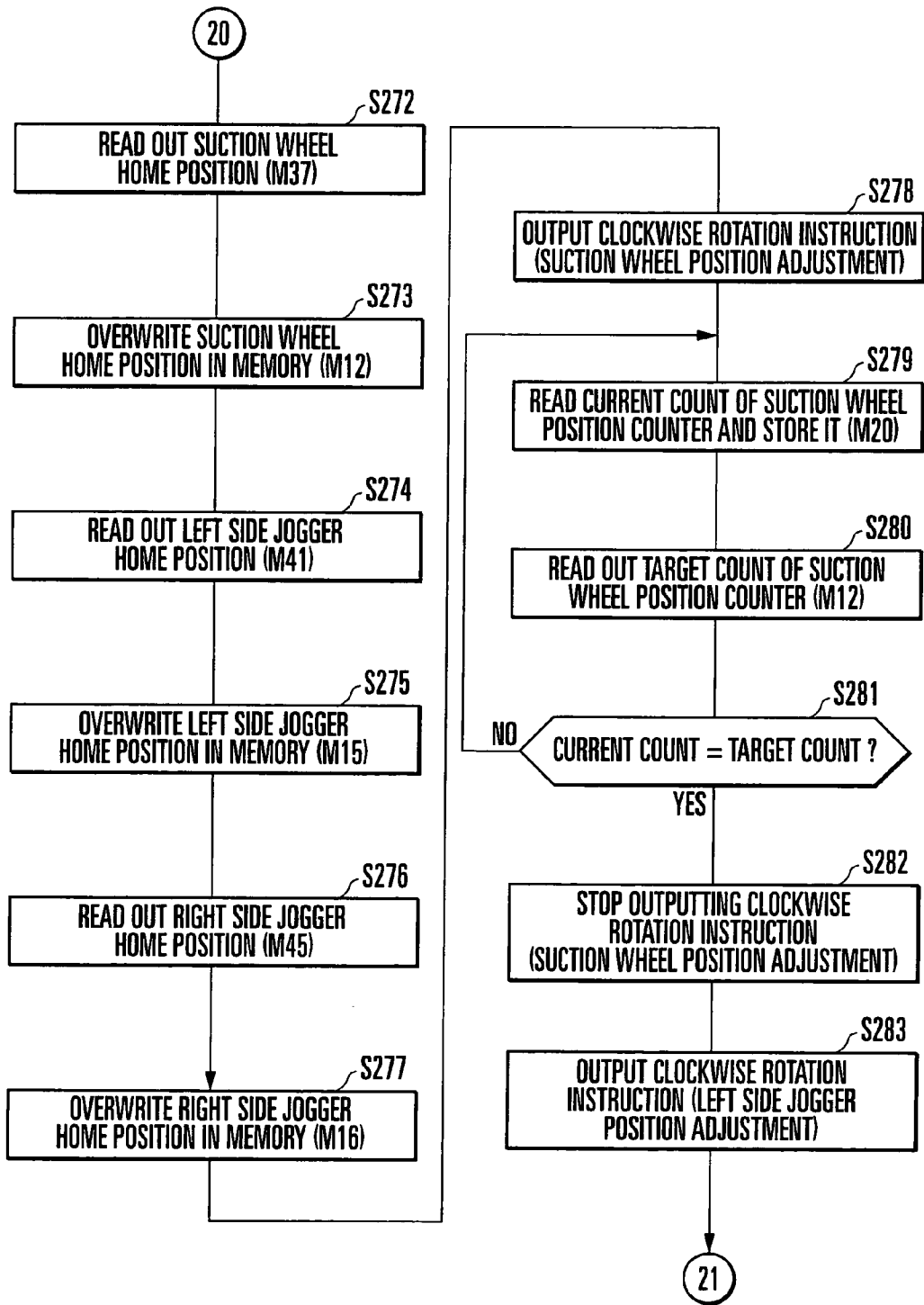


FIG. 5Y

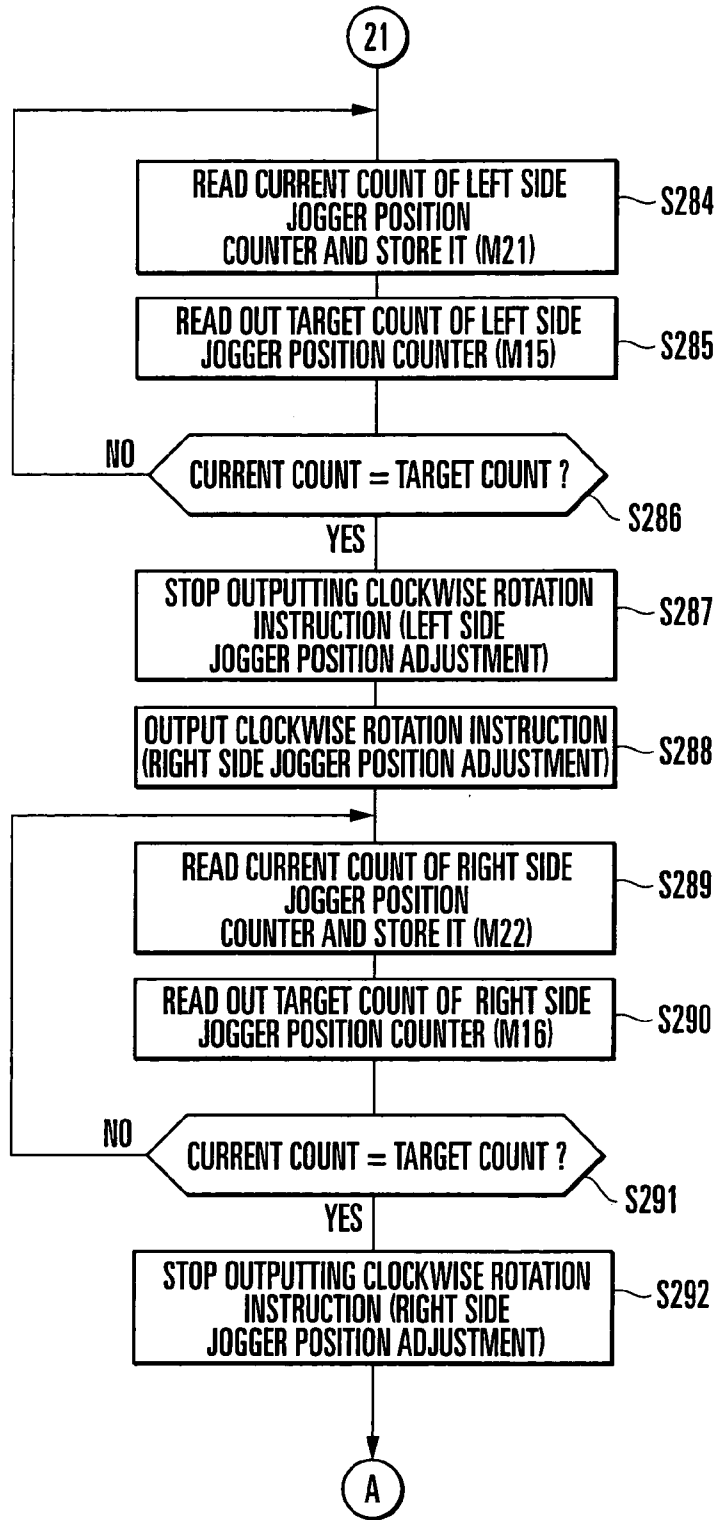


FIG. 5Z

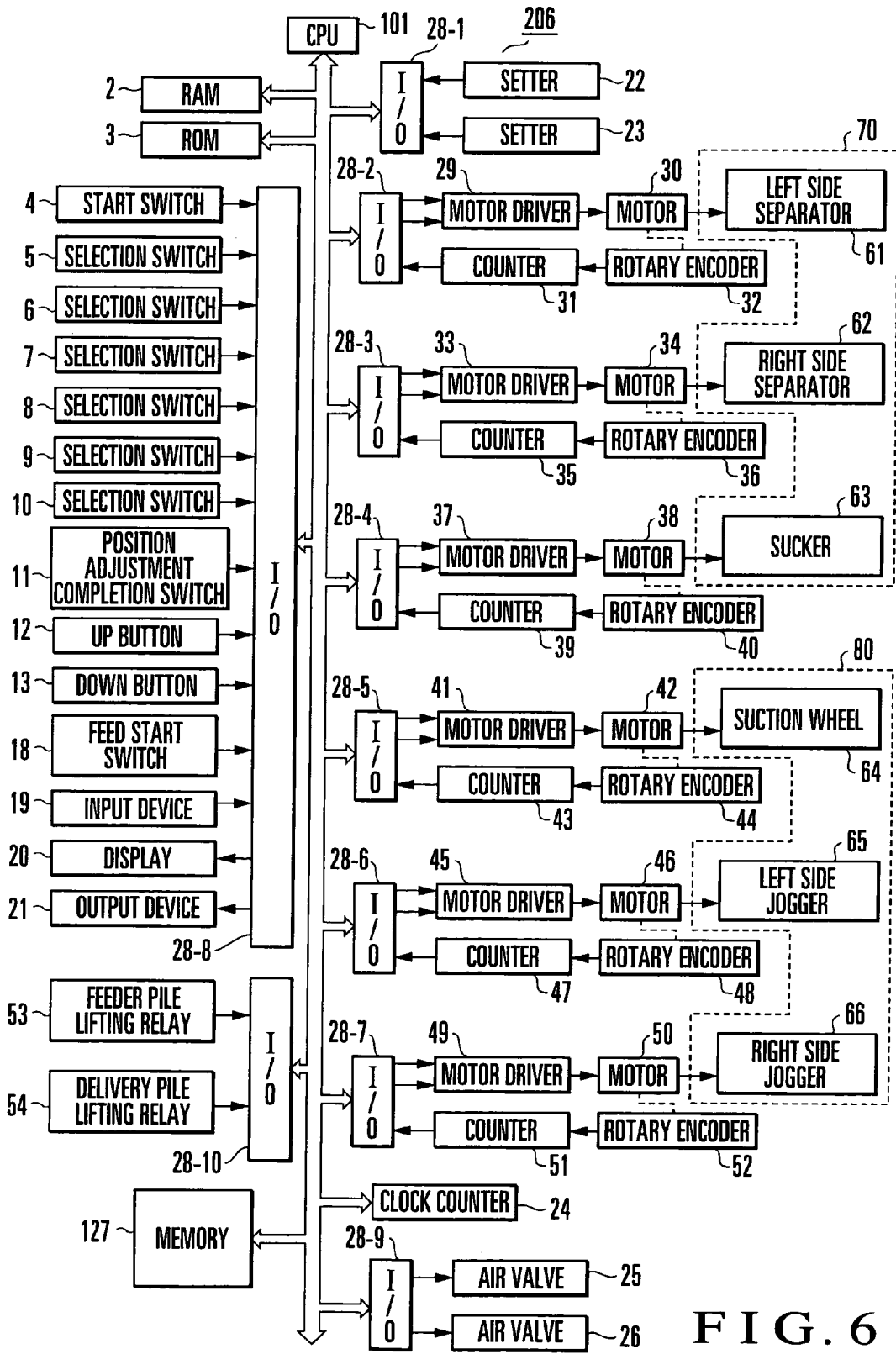


FIG. 6

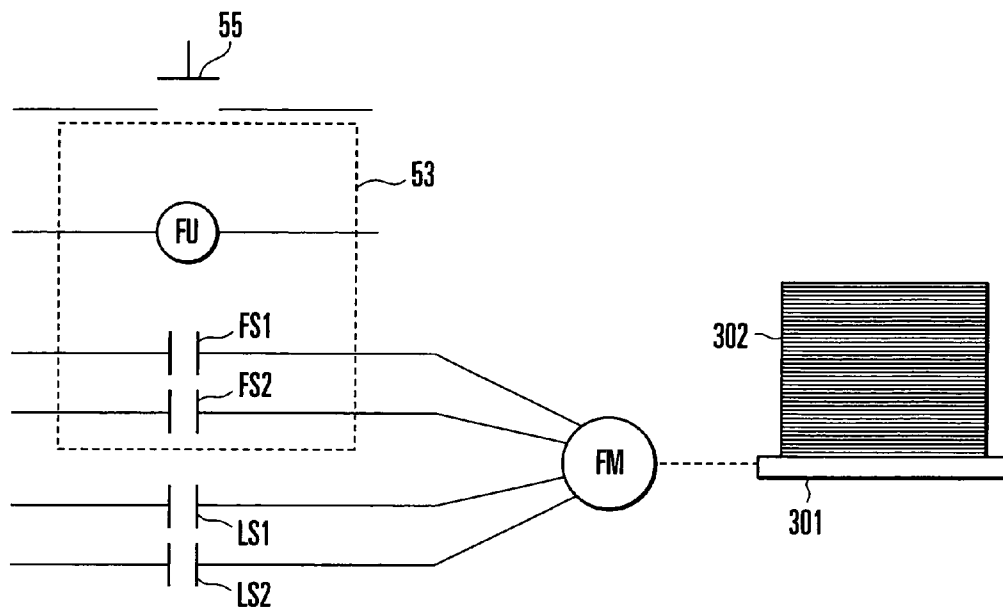


FIG. 7

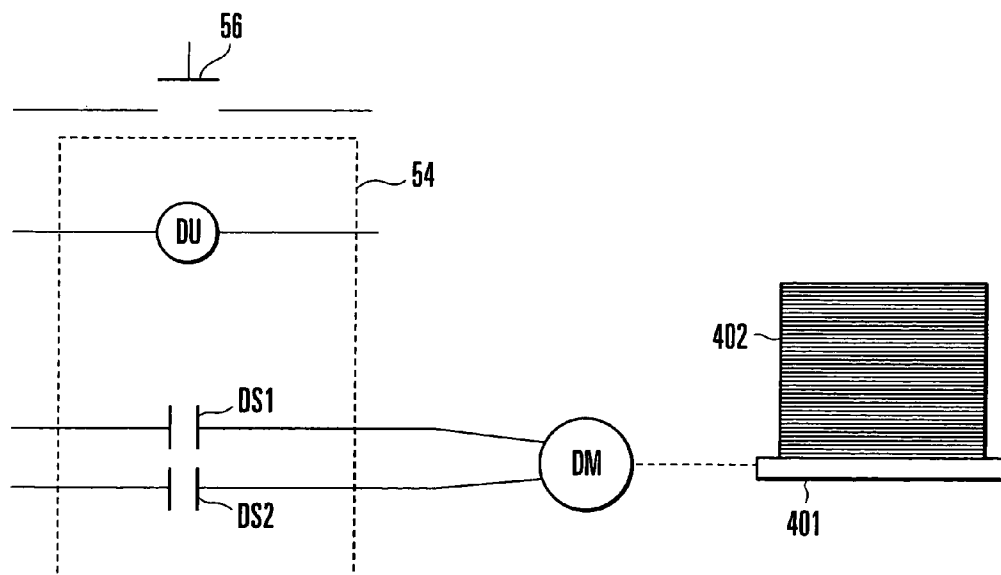


FIG. 8

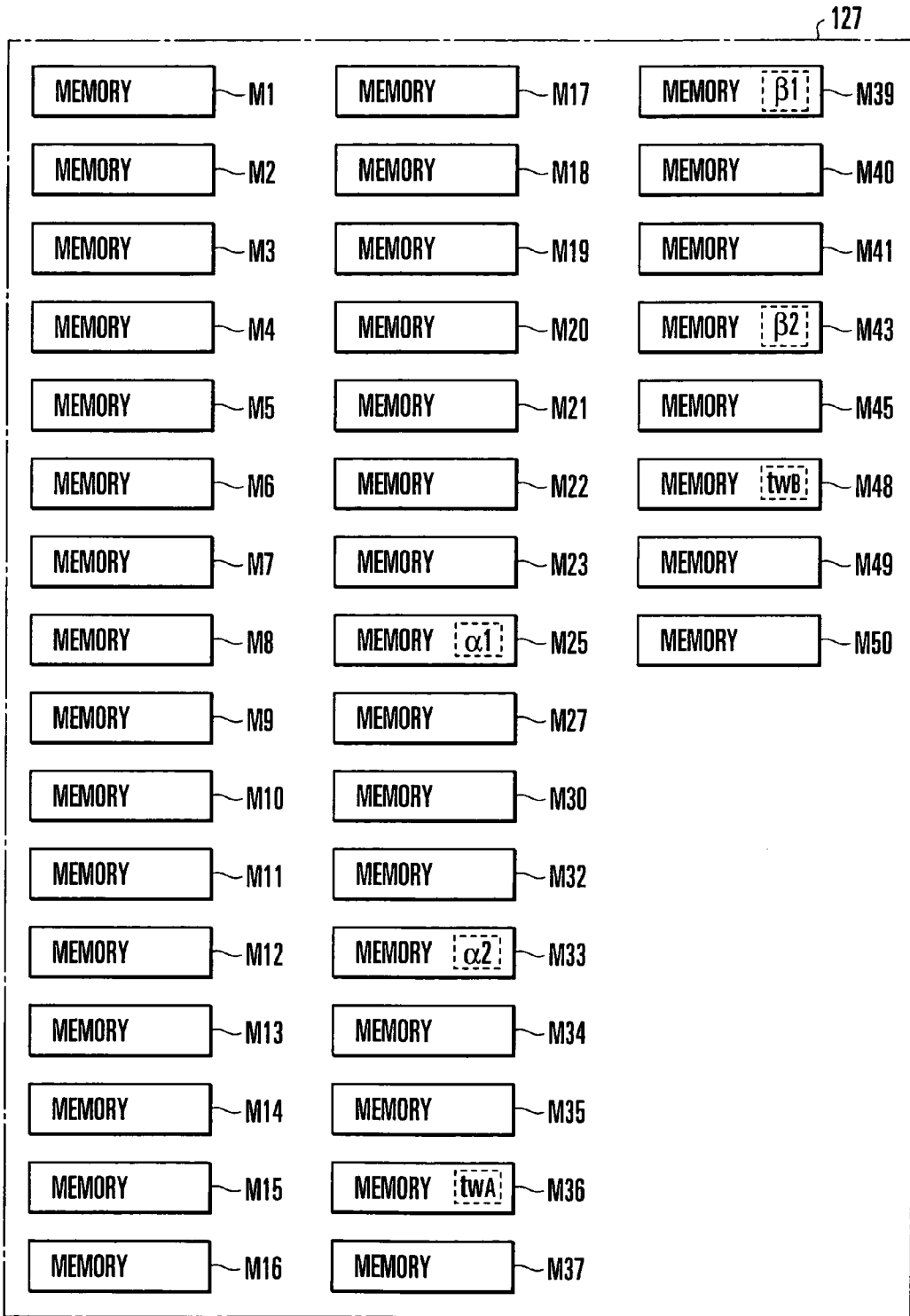


FIG. 9

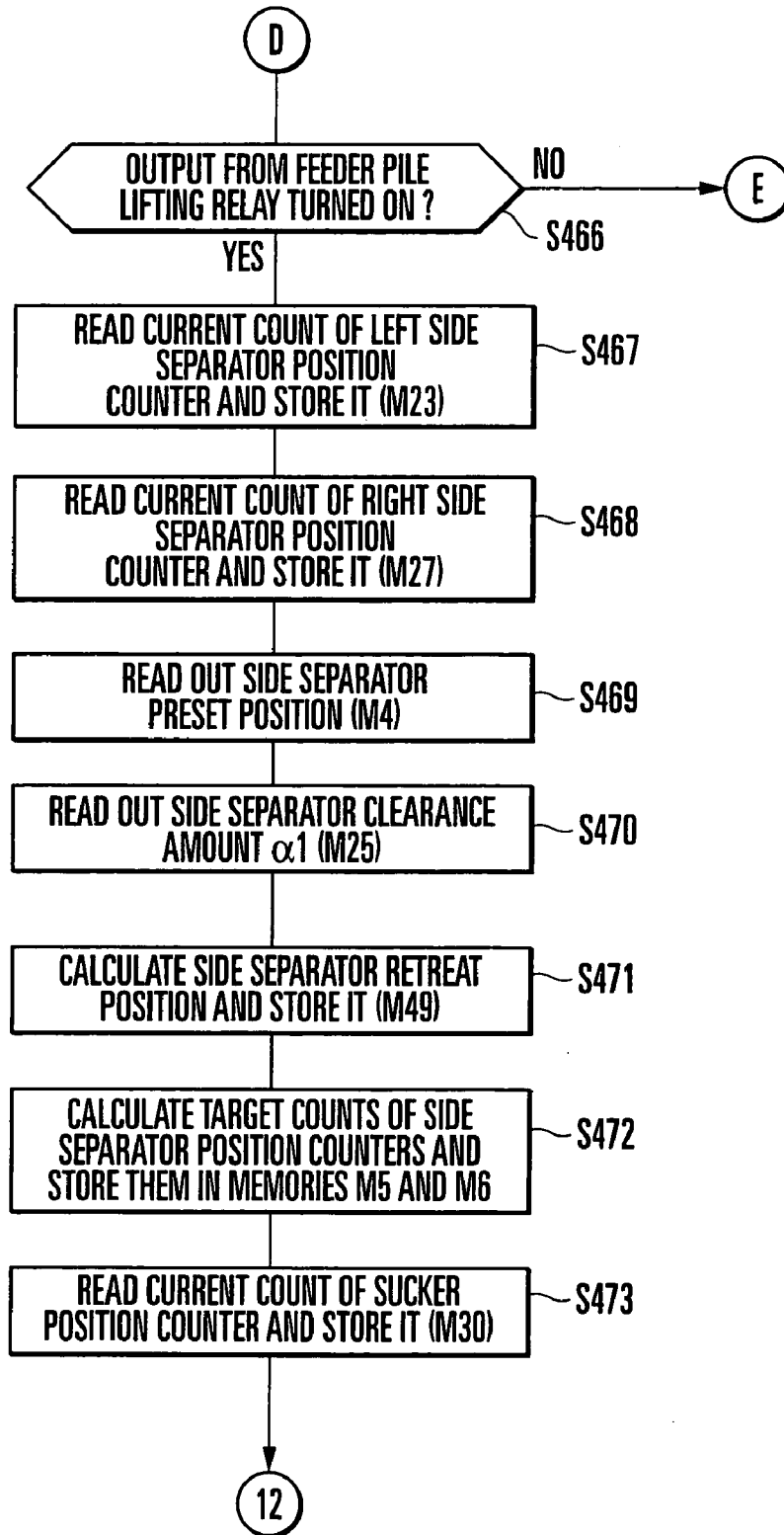


FIG. 10A

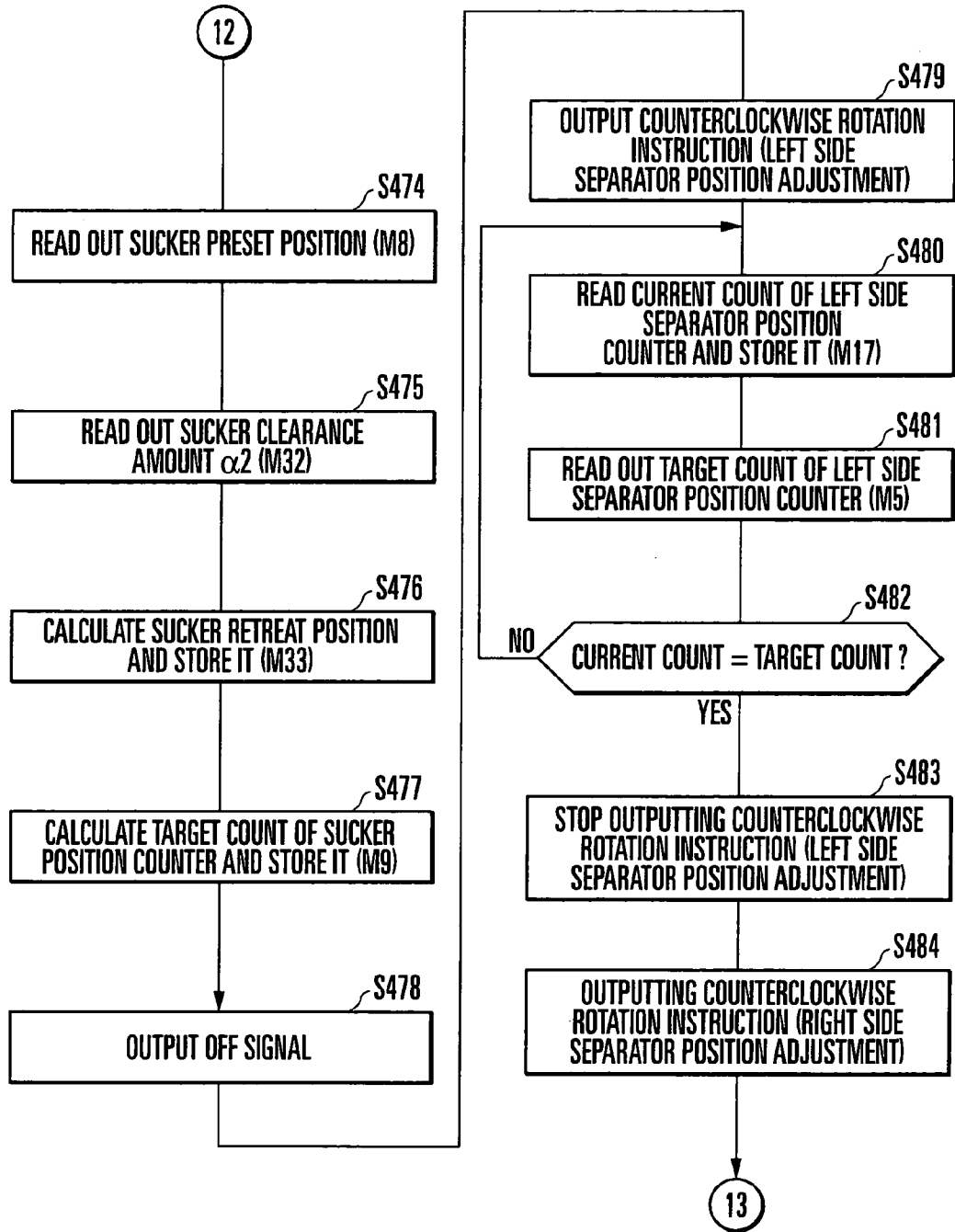


FIG. 10B

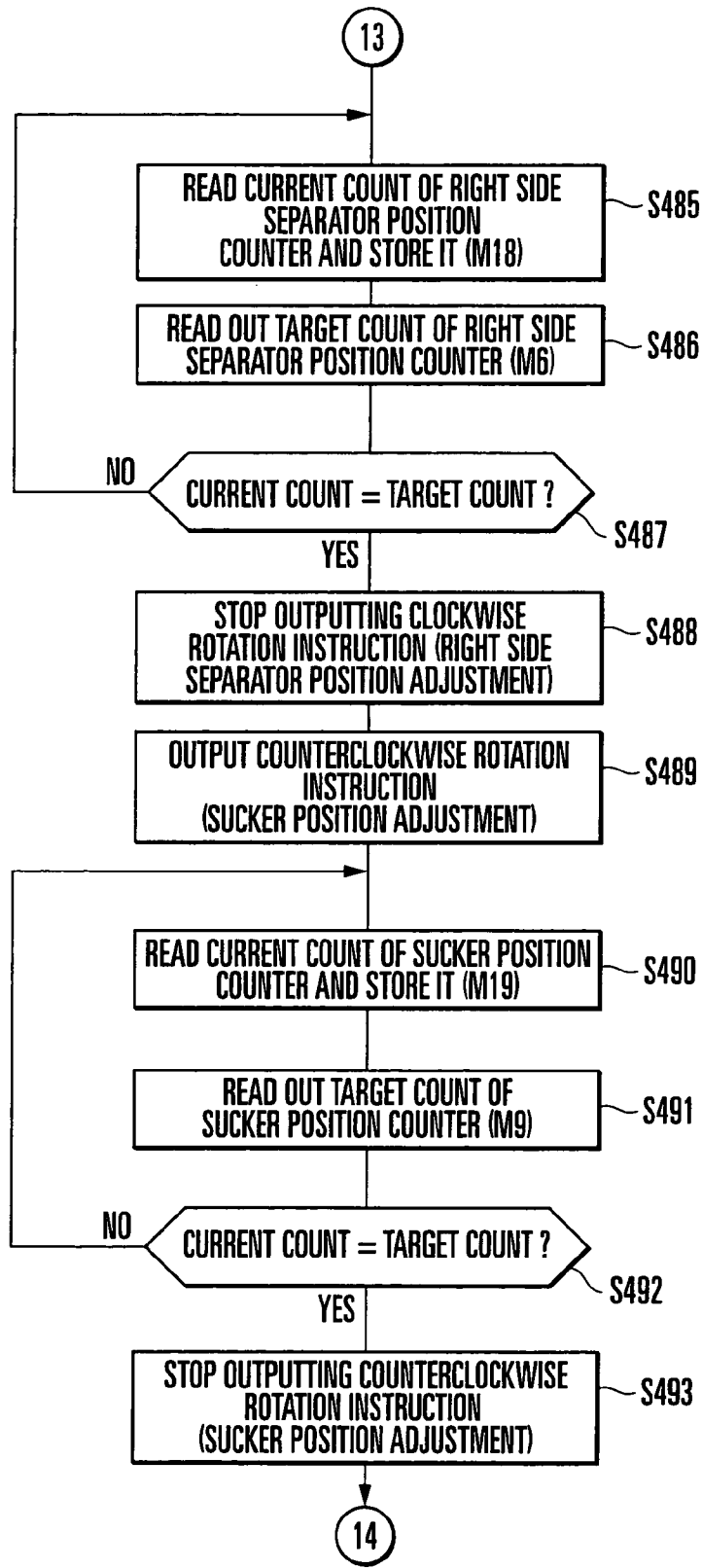


FIG. 10C

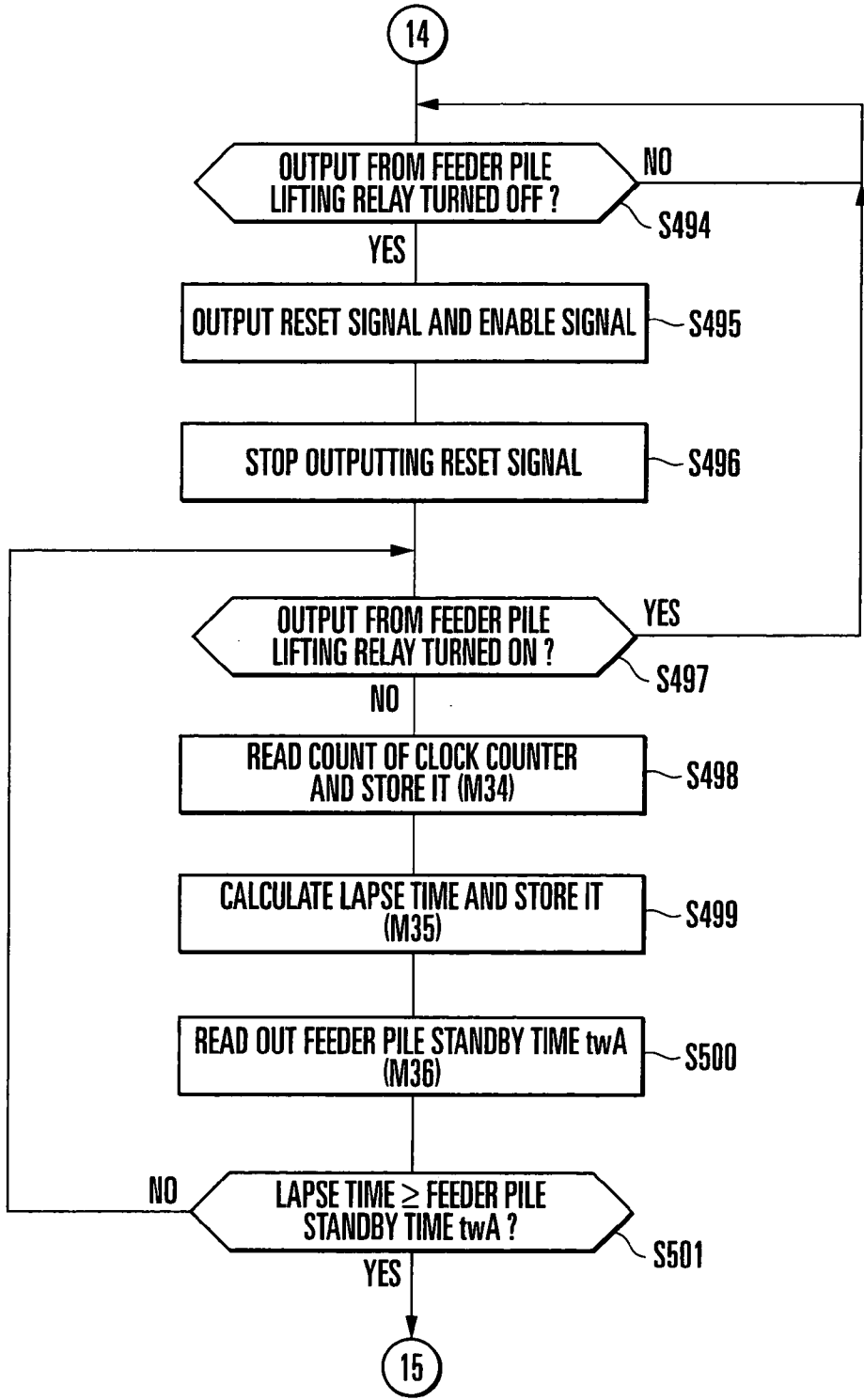


FIG. 10D

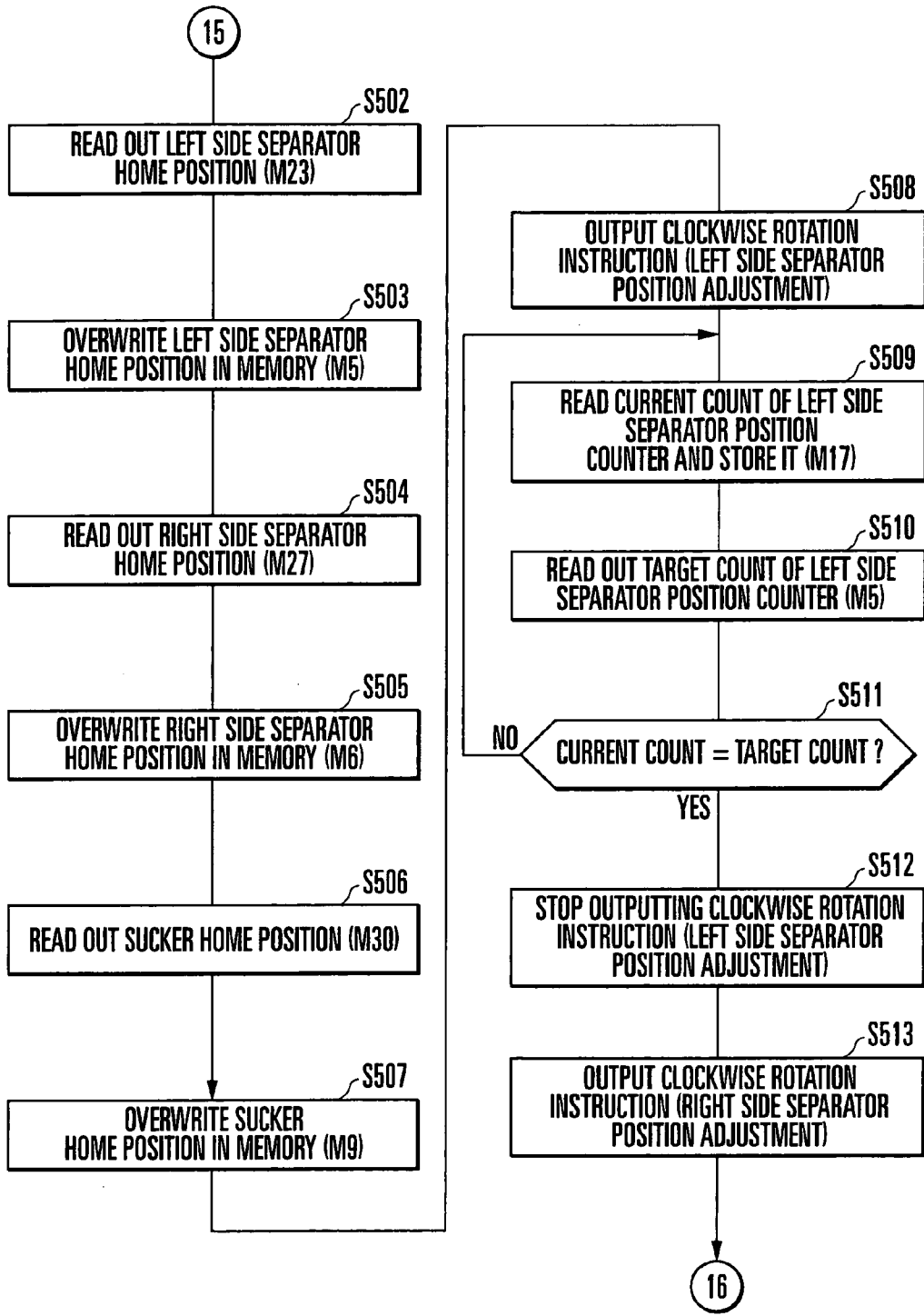


FIG. 10E

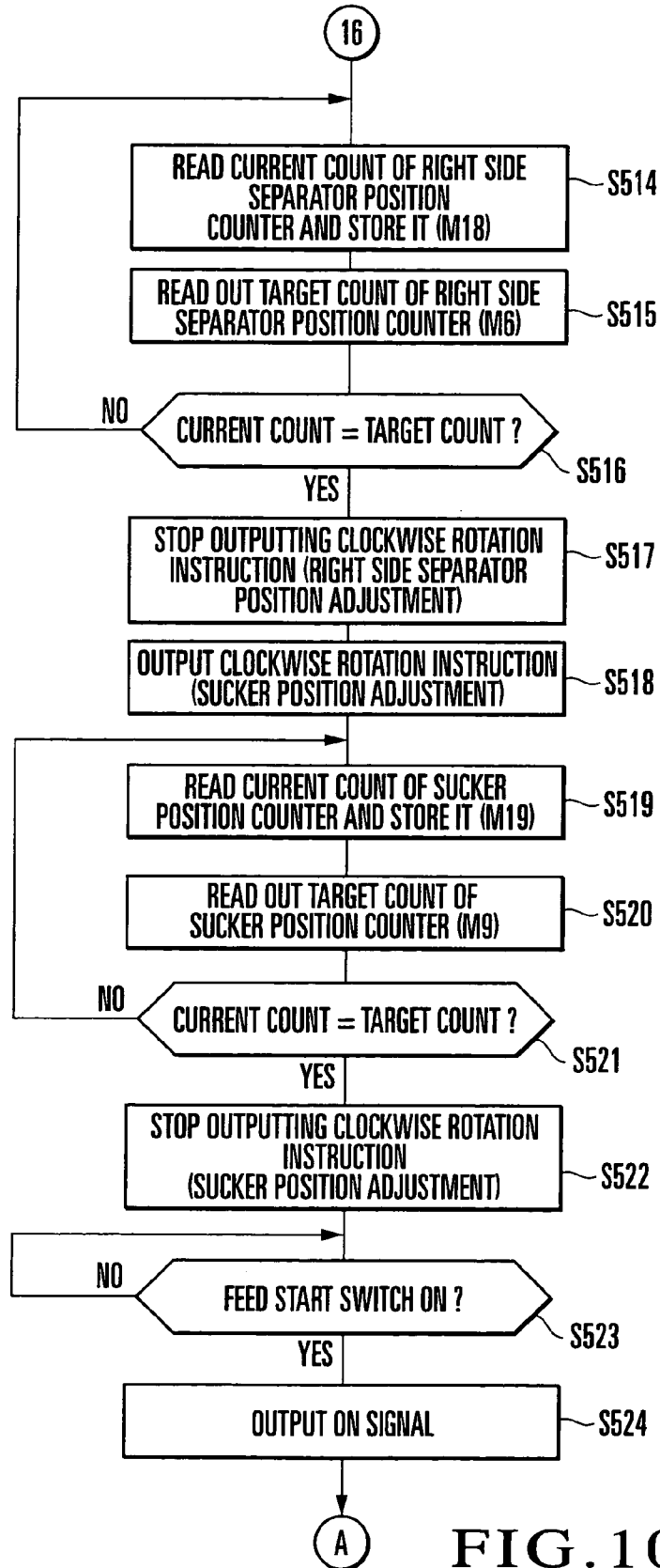


FIG. 10F

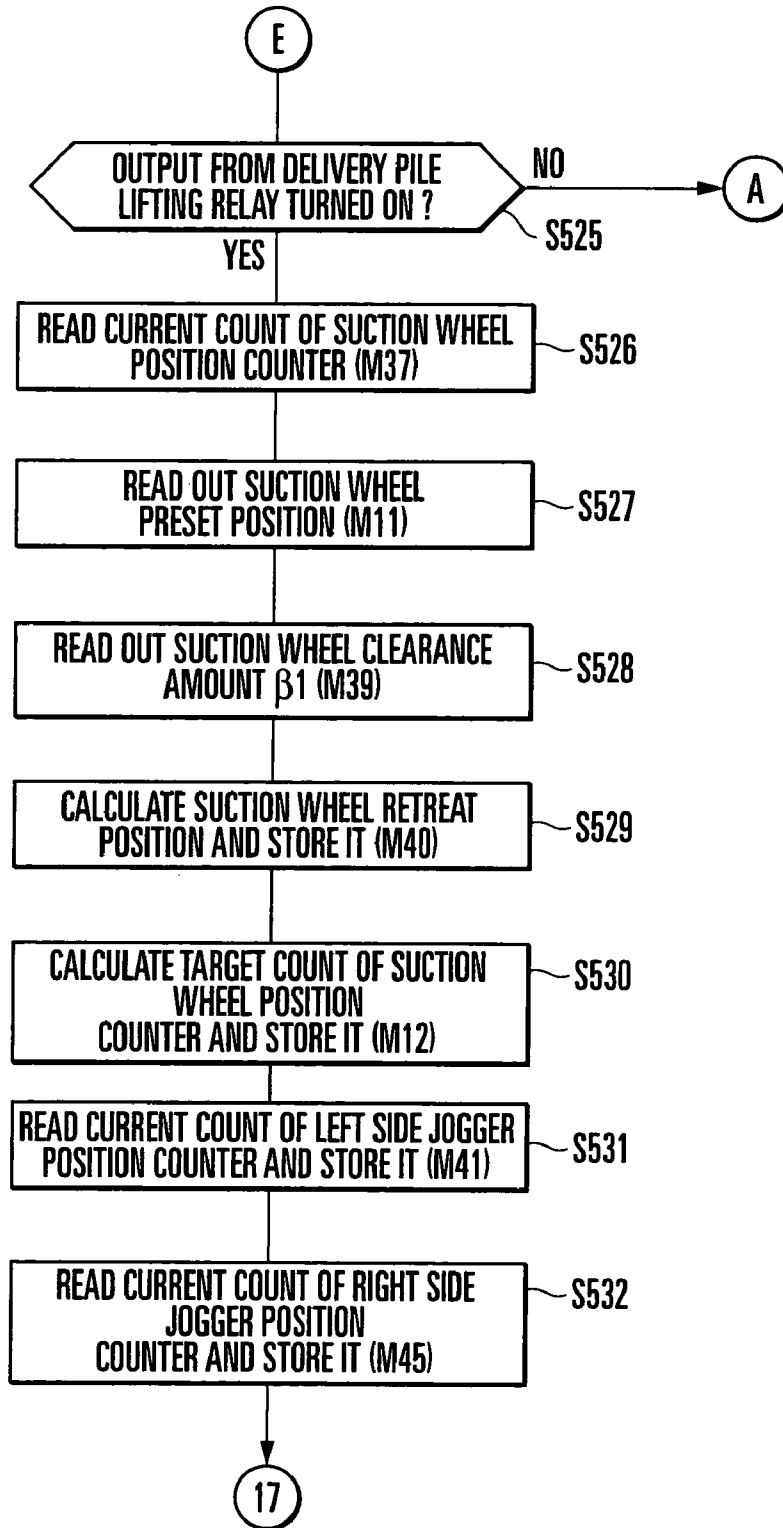


FIG. 10G

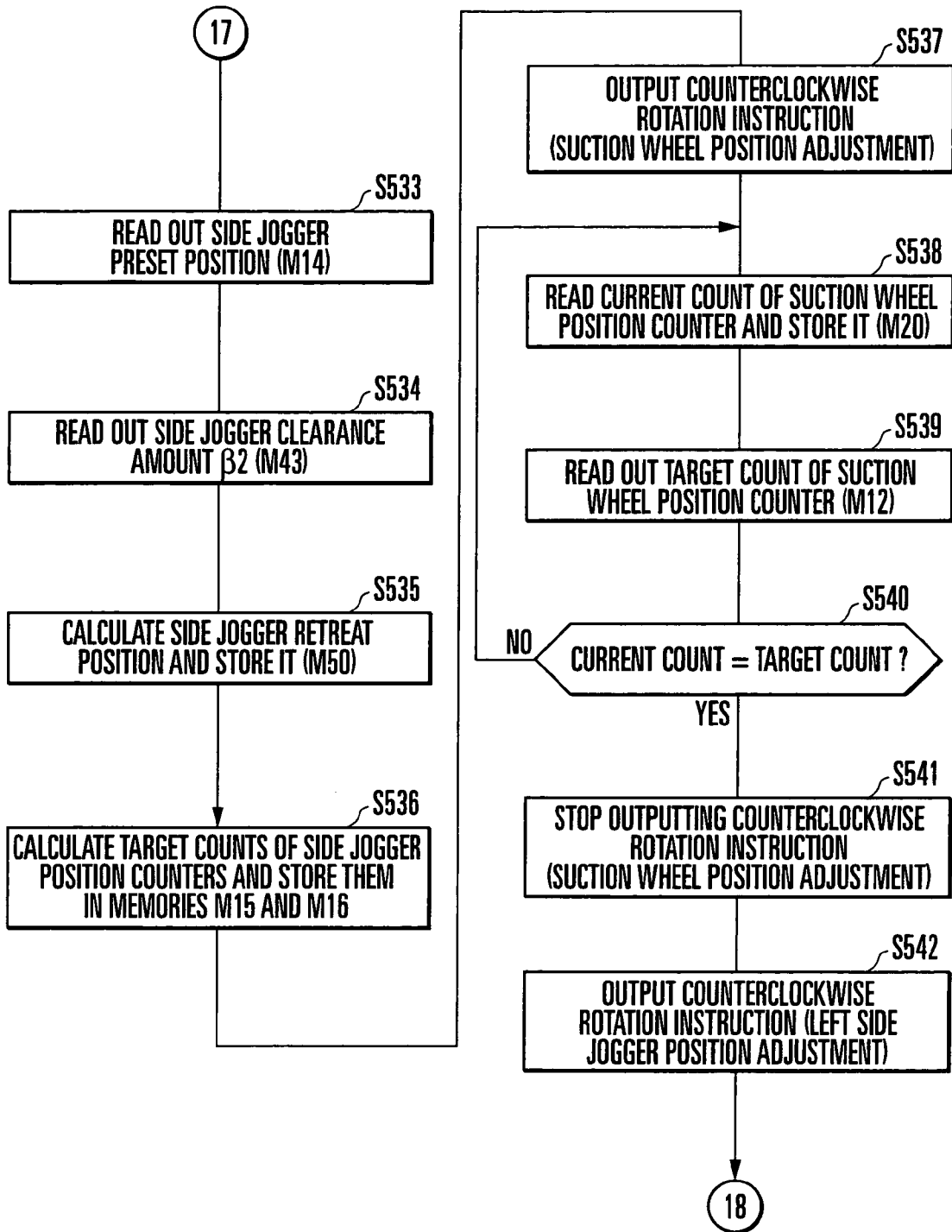


FIG. 10H

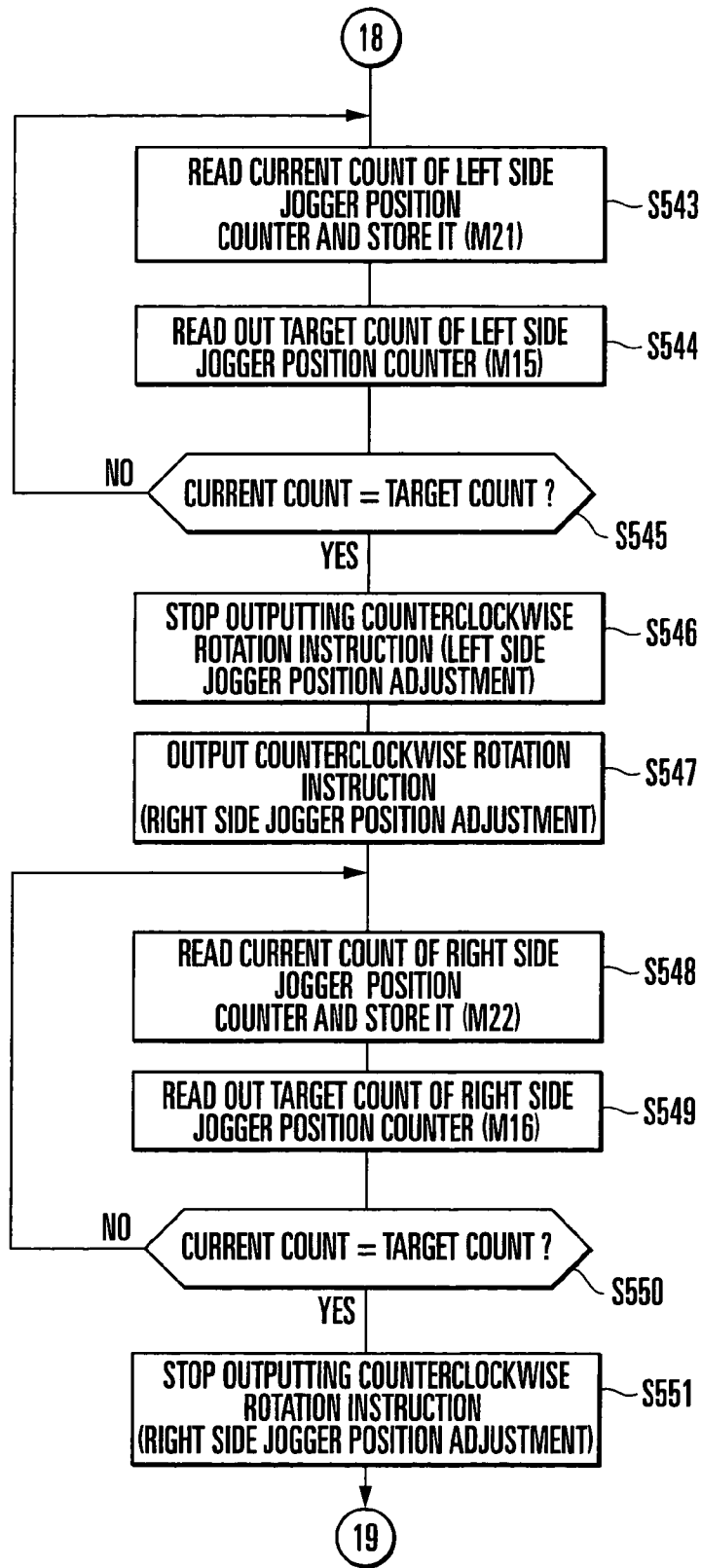


FIG. 101

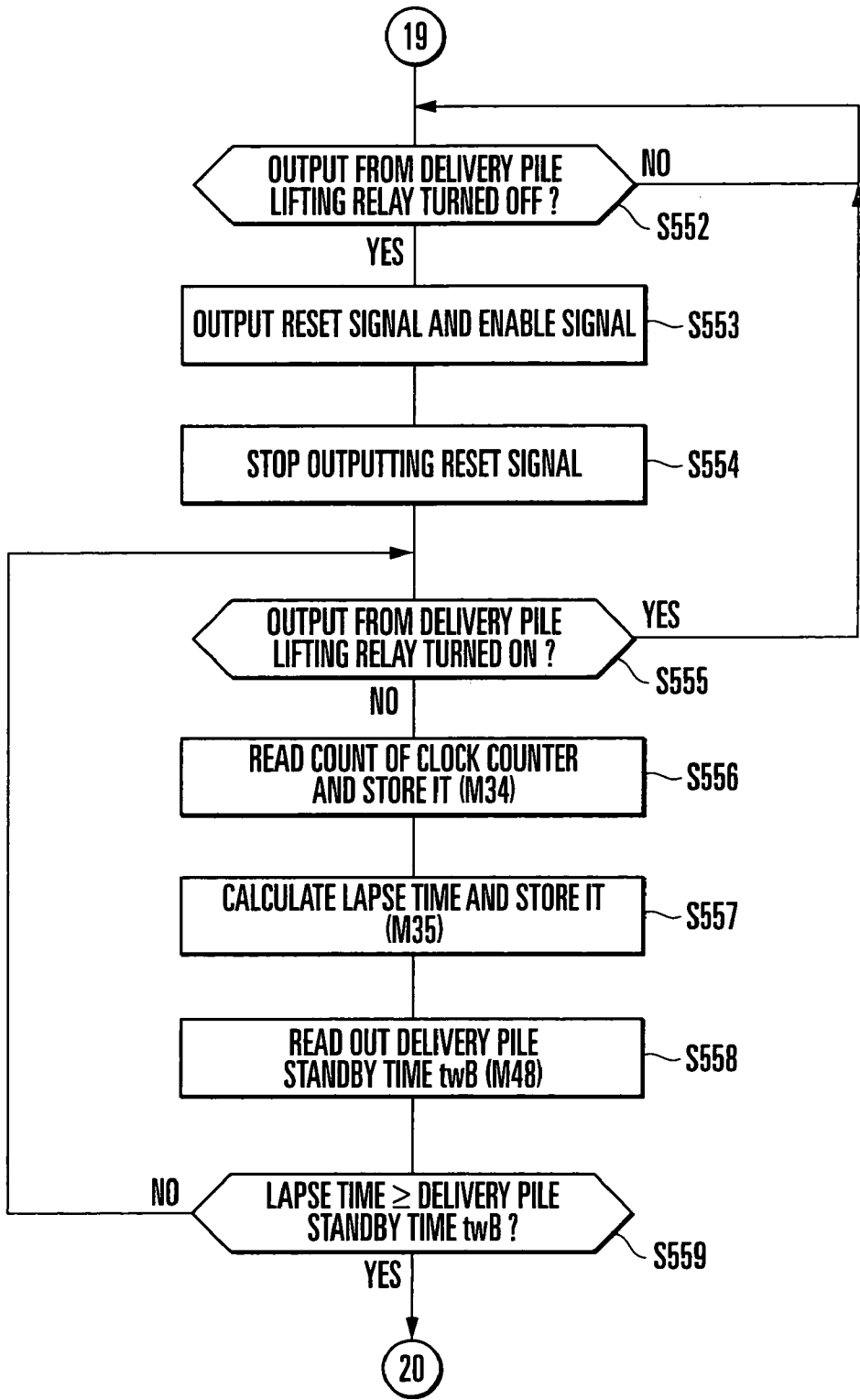


FIG. 10J

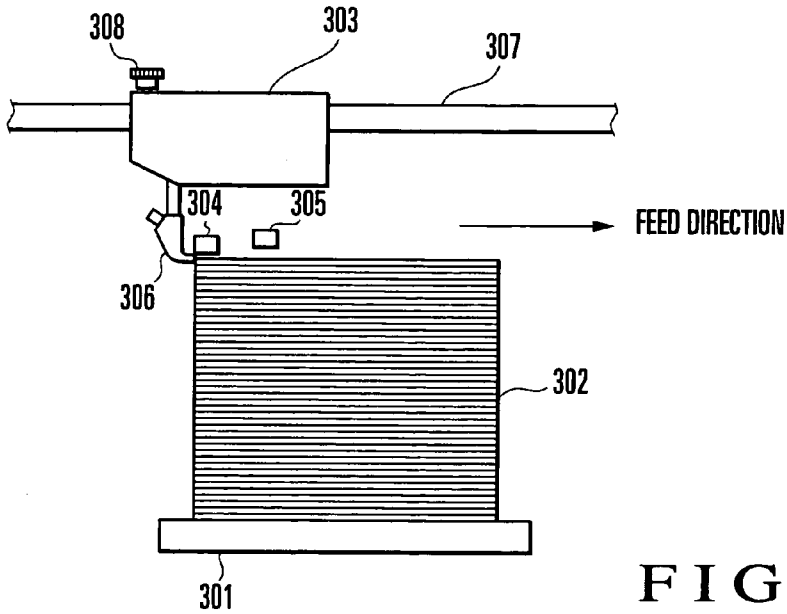


FIG. 11
PRIOR ART

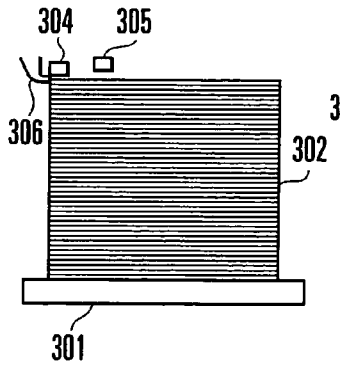


FIG. 12A
PRIOR ART

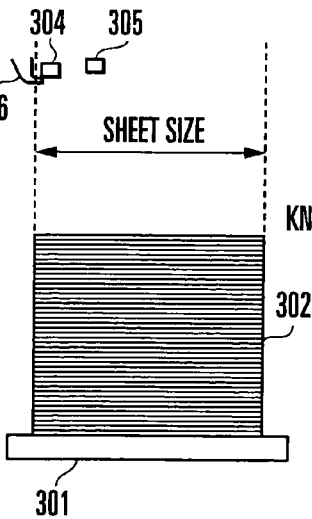


FIG. 12B
PRIOR ART

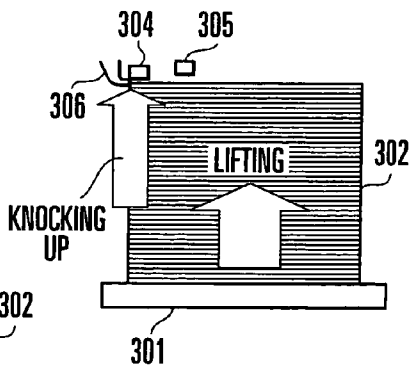


FIG. 12C
PRIOR ART

**POSITION ADJUSTING METHOD AND
APPARATUS FOR ADJUSTMENT TARGET
PORTION IN SHEET PROCESSING
MACHINE**

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a position adjusting method and apparatus for an adjustment target portion in a sheet processing machine comprising the adjustment target portion, e.g., a sucker and side separator in a feed unit, a suction wheel and side jogger in a delivery unit, or the like, the position of which is adjusted in accordance with the size of a sheet stacked on a pile board.

[0002] A sheet-fed offset printing press comprises a feed unit (feeder) which feeds sheets stacked on a pile board. The sheets stacked on the pile board of the feed unit are gripped one by one by the suction part of a sucker located above the pile board. As the suction part advances, a feed roller captures the gripped sheet and feeds it onto a feeder board.

[0003] A feed unit in a conventional sheet-fed offset printing press shown in FIG. 11 comprises a pile board 301 on which sheets 302 are stacked, and a sucker box 303 having a first suction port 304, second suction port 305, and leveling foot 306, as described in Japanese Utility Model Laid-Open No. 63-161238. An adjusting screw 308 fixes the sucker box 303 onto a support shaft 307 at a predetermined position in a feed direction (sheet convey direction).

[0004] In the feed unit having the above arrangement, the first suction port 304 grips the sheets 302 stacked on the pile board 301 one by one from the upper layer. The sheet gripped by the first suction port 304 is then gripped by the second suction port 305 and conveyed in the feed direction. At this time, air from the leveling foot 306 separates the first sheet 302 from the second and subsequent sheets 302. As the sheets 302 are fed and decrease accordingly, the pile board 301 is lifted automatically. When the sheets 302 stacked on the pile board 301 are consumed, the operator lowers the pile board 301 by manual operation and stacks new sheets 302 on the pile board 301. After that, the pile board 301 is lifted by manual operation, and feed operation resumes.

[0005] Before starting the feed operation, the operator manually adjusts the position of the sucker box 303 in accordance with the sheet size of the sheets 302 on the pile board 301 (the whole arrangement of the sucker box 303 including the suction ports 304 and 305 and leveling foot 306 will be referred to as a sucker hereinafter). More specifically, the operator adjusts the sucker to a position (a position corresponding to the sheet size) where the air outlet port of the leveling foot 306 opposes the side edge face of the uppermost sheet 302 on the pile board 301. The sucker box 303 is moved along the support shaft 307 to a position corresponding to the sheet size, and is fixed by the adjusting screw 308.

[0006] In the conventional apparatus described above, the operator manually adjusts the position of the sucker in accordance with the sheet size of the sheets 302 on the pile board 301. Recently, however, the sucker position is automatically adjusted by a computer process. In this case, the preset position of the sucker is automatically set by the computer in accordance with the sheet size (the sheet size of the sheet to be fed) of the sheet on the pile board which is input by the operator. The sucker moves to the preset position and stops there. The preset position of the sucker can be finely adjusted by manual switch operation. This method will be referred to as an automatic positioning method hereinafter.

[0007] According to the automatic sucker positioning method described above, the position of the sucker may fall inside the sheet size of the sheets stacked on the pile board due to a sheet cutting error, sheet misalignment during stacking, or the like.

[0008] As shown in FIG. 12A, the air outlet port of the leveling foot 306 is positioned to oppose the side edge face of the uppermost sheet 302 on the pile board 301. When printing is started, the pile board 301 is lifted and sheets are fed from it. When the sheets 302 on the pile board 301 are consumed, the pile board 301 is lowered upon push button operation of the operator, and new sheets 302 are stacked on the pile board 301.

[0009] At this time, the distal end of the leveling foot 306 may fall inside the sheet size of the sheet 302 stacked on the pile board 301, as shown in FIG. 12B, due to a cutting error of the sheets 302, misalignment of the sheets 302 during stacking, or the like (the sheet 302 and leveling foot 306 may overlap in the sheet stacking direction). If the pile board 301 is lifted in this state, the sheets 302 stacked on the pile board 301 may knock up the leveling foot 306 to break it, as shown in FIG. 12C.

[0010] The feed unit of the sheet-fed offset printing press comprises side separators which align the left and right side edges of the sheets stacked on the pile board, as described in Japanese Utility Model Laid-Open No. 2-52839. The side separators are also adjusted at positions corresponding to the size of the sheets stacked on the pile board. Hence, the same problem as in the sucker occurs due to a cutting error of the sheets 302, misalignment of the sheets 302 during stacking, or the like.

[0011] The delivery unit (delivery) of the sheet-fed offset printing press comprises a suction wheel which brakes the sheet to be delivered from traveling forward due to the inertia of the conveyance so that the sheet drops onto the pile board and is stacked there correctly, as described in Japanese Utility Model Laid-Open Nos. 60-96345 and 6-33860. Furthermore, the delivery unit also comprises side joggers which abut against the two side edges of a dropping sheet and reciprocally vibrate in directions to approach and further separate from the sheet to align the sheet to be dropped and stacked in the left-and-right direction, as described in Japanese Utility Model Laid-Open Nos. 6-33860 and 2-135565. The suction wheel and side joggers described above are also adjusted at positions corresponding to the size of the sheets stacked on the pile board.

[0012] In the delivery unit, the respective sides of the sheet to be delivered may curl due to the ink thickness and paper characteristics so that the delivered sheet size becomes smaller than it really is. In this case, to align the sheets well, the operator performs fine adjustment to move the suction wheel and side joggers slightly inward. In this state, if the pile board is manually lowered once and then lifted again due to any trouble or the like, the sheets on the pile board may knock up the suction wheel or side joggers to break them.

SUMMARY OF THE INVENTION

[0013] It is an object of the present invention to provide a position adjusting method and apparatus for an adjustment target portion in a sheet processing machine in which the adjustment target portion, the position of which is adjusted in accordance with the size of the sheets stacked on the pile board, is prevented from being broken.

[0014] In order to achieve the above object, according to an aspect of the present invention, there is provided a position adjusting method for an adjustment target portion in a sheet processing machine comprising a pile board which is lifted and lowered with a sheet stacked thereon, and the adjustment target portion (**61-66**) a position of which is adjusted in accordance with a size of the sheet on the pile board, comprising the steps of lifting the pile board with the sheet stacked thereon, and moving the adjustment target portion in a direction to further separate from a center of the sheet on the pile board as the pile board is lifted.

[0015] According to another aspect of the present invention, there is also provided a position adjusting apparatus comprising a pile board which is lifted and lowered with a sheet stacked thereon, an adjustment target portion a position of which is adjusted in accordance with a size of the sheet on the pile board, and moving means for moving the adjustment target portion in a direction to further separate from a center of the sheet on the pile board as the pile board is lifted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a block diagram of a position adjusting apparatus for an adjustment target portion in a sheet processing machine according to the first embodiment of the present invention;

[0017] FIG. 2 is a block diagram showing in detail a memory unit shown in FIG. 1;

[0018] FIGS. 3A to 3D are views for explaining the operation of the adjustment target portion when lifting the feeder pile of a feed unit by manual operation;

[0019] FIGS. 4A to 4D are views for explaining the operation of the adjustment target portion when lifting the delivery pile of a delivery unit by manual operation;

[0020] FIGS. 5A to 5Z are flowcharts for explaining the processing operation of a CPU shown in FIG. 1;

[0021] FIG. 6 is a block diagram of a position adjusting apparatus for an adjustment target portion in a sheet processing machine according to the second embodiment of the present invention;

[0022] FIG. 7 is a circuit diagram for lifting a feeder pile using a feeder pile lifting relay (by manual operation) shown in FIG. 6;

[0023] FIG. 8 is a view showing an example of a circuit to lift a delivery pile using a delivery pile lifting relay shown in FIG. 6;

[0024] FIG. 9 is a view showing in detail a memory unit shown in FIG. 6;

[0025] FIGS. 10A to 10J are flowcharts for explaining the processing operation of a CPU shown in FIG. 6;

[0026] FIG. 11 is a view schematically showing a feed unit in a conventional sheet-fed offset printing press; and

[0027] FIGS. 12A to 12C are views for explaining conventional problems that arise when lifting the feeder pile of a feed unit by manual operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0028] A position adjusting apparatus for an adjustment target portion in a sheet processing machine according to the first embodiment of the present invention will be described with reference to FIGS. 1 to 5Z. In this embodiment, the adjustment target portion, the position of which is adjusted in

accordance with the size of sheets stacked on a pile board, will be exemplified by the sucker and side separators of a feed unit and the suction wheel and side joggers of a delivery unit in a sheet-fed offset printing press.

[0029] As shown in FIG. 1, a left side separator **61** and right side separator **62** are provided as the side separators. A left side jogger **65** and right side jogger **66** are provided as the side joggers. Reference numeral **63** denotes a sucker; and **64**, a suction wheel.

[0030] A position adjusting apparatus **100** for the adjustment target portion comprises a CPU (Central Processing Unit) **1**, a RAM (Random Access Memory) **2**, a ROM (Read Only Memory) **3**, a start switch **4**, selection switches **5** to **10**, a switch **11**, an UP button **12**, a DOWN button **13**, selection switches **14** and **15**, a lifting button **16**, a lowering button **17**, a switch **18**, an input device **19** such as a keyboard, a display **20**, an output device **21**, setters **22** and **23**, an internal clock counter **24**, air valves **25** and **26**, a memory unit **27**, and interfaces (I/O) **28-1** to **28-9**. The start switch **4** designates presetting of the sheet size. The selection switch **5** designates left side separator position adjustment. The selection switch **6** designates right side separator position adjustment. The selection switch **7** designates sucker position adjustment. The selection switch **8** designates suction wheel position adjustment. The selection switch **9** designates left side jogger position adjustment. The selection switch **10** designates right side jogger position adjustment. The switch **11** designates position adjustment completion. The UP button **12** designates movement inward the sheet size. The DOWN button **13** designates movement outward the sheet size. The selection switch **14** designates lifting and lowering of a feeder pile. The selection switch **15** designates lifting and lowering of a delivery pile. The lifting button **16** designates lifting of the feeder pile. The lowering button **17** designates lowering of the feeder pile. The switch **18** designates feed start. The output device **21** comprises various types of disk drives and a printer. The setter **22** sets the length of a printing sheet in the sheet convey direction. The setter **23** sets the length of the printing sheet in the widthwise direction. The air valve **25** turns on/off air supply to the sucker. The air valve **26** turns on/off air supply to the side separators.

[0031] The position adjusting apparatus **100** further comprises a motor driver **29**, motor **30**, counter **31**, and rotary encoder **32** for left side separator position adjustment to correspond to the left side separator **61**. The position adjusting apparatus **100** also further comprises a motor driver **33**, motor **34**, counter **35**, and rotary encoder **36** for right side separator position adjustment to correspond to the right side separator **62**.

[0032] The position adjusting apparatus **100** further comprises a motor driver **37**, motor **38**, counter **39**, and rotary encoder **40** for sucker position adjustment to correspond to the sucker **63**. The position adjusting apparatus **100** also further comprises a motor driver **41**, motor **42**, counter **43**, and rotary encoder **44** to correspond to the suction wheel **64**.

[0033] The position adjusting apparatus **100** further comprises a motor driver **45**, motor **46**, counter **47**, and rotary encoder **48** for left side jogger position adjustment to correspond to the left side jogger **65**. The position adjusting apparatus **100** also further comprises a motor driver **49**, motor **50**, counter **51**, and rotary encoder **52** for right side jogger position adjustment to correspond to the right side jogger **66**.

[0034] Upon reception of various types of input information supplied through the input/output interfaces **28-1** to **28-9**,

the CPU 1 operates in accordance with a program stored in the ROM 3 while accessing the RAM 2 and memory unit 27. The ROM 3 stores a position adjustment program for the adjustment target portion as a program unique to this embodiment. The CPU 1 outputs a clockwise rotation signal and counter-clockwise rotation signal to the motor drivers 29, 33, 37, 41, 45, and 49 via the input/output interfaces 28-2 to 28-7.

[0035] As shown in FIG. 2, the memory unit 27 comprises memories M1 to M16. The memory M1 stores the length of the printing sheet in the convey direction. The memory M2 stores the length of the printing sheet in the widthwise direction. The memory M3 stores a conversion table for converting the length of the printing sheet in the widthwise direction into the side separator position. The memory M4 stores the side separator preset position. The memory M5 stores the target count of the left side separator position counter 31. The memory M6 stores the target count of the right side separator position counter 35. The memory M7 stores a conversion table for converting the length of the printing sheet in the convey direction into the sucker position. The memory M8 stores the sucker preset position. The memory M9 stores the target count of the sucker position counter 39. The memory M10 stores a conversion table for converting the length of the printing sheet in the convey direction into the suction wheel position. The memory M11 stores the suction wheel preset position. The memory M12 stores the target count of the suction wheel position counter 43. The memory M13 stores a conversion table for converting the length of the printing sheet in the widthwise direction into the side jogger position. The memory M14 stores a side jogger preset position. The memory M15 stores the target count of the left side jogger position counter 47. The memory M16 stores the target position of the right side jogger position counter 51.

[0036] The memory unit 27 further comprises memories M17 to M29. The memory M17 stores the current count of the left side separator position counter 31. The memory M18 stores the current count of the right side separator position counter 35. The memory M19 stores the current count of the sucker position counter 39. The memory M20 stores the current count of the suction wheel position counter 43. The memory M21 stores the current count of the left side jogger position counter 47. The memory M22 stores the current count of the right side jogger position counter 51. The memory M23 stores a left side separator home position. The memory M24 stores a left side separator current position. The memory M25 stores a predetermined left side separator clearance amount. The memory M26 stores a left side separator retreat position. The memory M27 stores a right side separator home position. The memory M28 stores a right side separator current position. The memory M29 stores a right side separator retreat position.

[0037] The memory unit 27 further comprises memories M30 to M48. The memory M30 stores a sucker home position. The memory M31 stores a sucker current position. The memory M32 stores a predetermined sucker clearance amount. The memory M33 stores a sucker retreat position. The memory M34 stores the count of the internal clock counter 24. The memory M35 stores a lapse time. The memory M36 stores a predetermined feeder pile standby time. The memory M37 stores a suction wheel home position. The memory M38 stores a suction wheel current position. The memory M39 stores a predetermined suction wheel clearance amount. The memory M40 stores a suction wheel retreat position. The memory M41 stores a left side jogger

home position. The memory M42 stores a left side jogger current position. The memory M43 stores a predetermined side jogger clearance amount. The memory M44 stores a left side jogger retreat position. The memory M45 stores a right side jogger home position. The memory M46 stores a right side jogger current position. The memory M47 stores a right side jogger retreat position. The memory M48 stores a predetermined delivery pile standby time.

[0038] The processing operation of the adjustment target portion performed by the CPU 1 will be described with reference to the flowcharts shown in FIGS. 5A to 5Z.

[Sheet Size Input]

[0039] When the start switch 4 is not ON (NO in step S1), the operator inputs the sheet size of the printing sheet (the sheet size of sheet to be fed). The sheet size of the printing sheet (the lengths of the printing sheet in the convey direction and widthwise direction) is input via the setters 22 and 23 (YES in steps S2 and S3). The length of the printing sheet in the convey direction input from the setter 22 is stored in the memory M1 (step S4). The length of the printing sheet in the widthwise direction input from the setter 23 is stored in the memory M2 (step S5).

[Automatic Adjustment to Preset Position in Accordance with Sheet Size]

[0040] When automatically adjusting the adjustment target portion to a preset position in accordance with the sheet size, the operator turns on the start switch 4 (YES in step S1). The CPU 1 reads out the conversion table for converting the length of the printing sheet in the widthwise direction into the side separator position from the memory M3 (step S6) and the length of the printing sheet in the widthwise direction from the memory M2 (step S7). Then, the CPU 1 obtains the side separator preset position from the length of the printing sheet in the widthwise direction using the conversion table read out in step S6, and stores it in the memory M4 (step S8).

[0041] The CPU 1 then calculates the target counts of the side separator position counters on the basis of the side separator preset positions obtained in step S8, and stores them in the memories M5 and M6 (step S9). In this case, the memory M5 stores the target count of the left side separator position counter 31, and the memory M6 stores the target count of the right side separator position counter 35.

[0042] The CPU 1 then reads out the conversion table for converting the length of the printing sheet in the convey direction into the sucker position from the memory M7 (step S10) and the length of the printing sheet in the convey direction from the memory M1 (step S11). Then, the CPU 1 obtains the sucker preset position from the length of the printing sheet in the convey direction using the readout conversion table, and stores it in the memory M8 (step S12). Then, the CPU 1 calculates the target count of the sucker position counter 39 on the obtained sucker preset position, and stores it in the memory M9 (step S13).

[0043] The CPU 1 then reads out the conversion table for converting the length of the printing sheet in the convey direction into the suction wheel position from the memory M10 (step S14) and the length of the printing sheet in the convey direction from the memory M1 (step S15). The CPU 1 then obtains the suction wheel preset position from the length of the printing sheet in the convey direction using the readout conversion table, and stores it in the memory M11 (step S16). The CPU 1 then calculates the target count of the

suction wheel position counter **43** on the basis of the obtained suction wheel preset position, and stores it in the memory **M12** (step **S17**).

[0044] The CPU **1** then reads out the conversion table for converting the length of the printing sheet in the widthwise direction into the side jogger position from the memory **M13** (step **S18**) and the length of the printing sheet in the widthwise direction from the memory **M2** (step **S19**). The CPU **1** then obtains the side jogger preset position from the length of the printing sheet in the widthwise direction, and stores it in the memory **M14** (step **S20**).

[0045] The CPU **1** then calculates the target counts of the side jogger position counter on the basis of the obtained side jogger preset position, and stores them in the memories **M15** and **M16** (step **S21**). In this case, the memory **M15** stores the target count of the left side jogger position counter **47**, and the memory **M16** stores the target count of the right side jogger position counter **51**.

[Automatic Adjustment of Left Side Separator to Preset Position]

[0046] The CPU **1** then reads the current count of the left side separator position counter **31** (step **S22**), and reads out the target count of the left side separator position counter **31** from the memory **M5** (step **S23**). The CPU **1** then checks whether or not the current count of the left side separator position counter **31** coincides with the target count (step **S24**).

[0047] If the current count does not coincide with the target count (NO in step **S24**) and is smaller than it (YES in step **S25**), the CPU **1** sends a clockwise rotation instruction to the motor driver **29** (step **S26**). Thus, the motor **30** rotates clockwise, and the left side separator **61** moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0048] During the movement of the left side separator **61**, the CPU **1** reads the current count of the left side separator position counter **31** (step **S27**), and reads out the target count of the left side separator position counter **31** from the memory **M5** (step **S28**). The CPU **1** then repeatedly checks whether or not the current count of the left side separator position counter **31** coincides with the target count (step **S29**).

[0049] If the current count coincides with the target count (YES in step **S29**), the CPU **1** stops outputting the clockwise rotation instruction to the motor driver **29** (step **S30**), so that the motor **30** stops rotation. Hence, the left side separator **61** automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0050] If the current count is larger than the target count (NO in step **S25**), the CPU **1** sends a counterclockwise rotation instruction to the motor driver **29** (step **S31**). Hence, the motor **30** rotates counterclockwise, and the left side separator **61** moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0051] During the movement of the left side separator **61**, the CPU **1** reads the current count of the left side separator position counter **31** (step **S32**), and reads out the target count of the left side separator position counter **31** from the memory **M5** (step **S33**). The CPU **1** then repeatedly checks whether or not the current count of the left side separator position counter **31** coincides with the target count (step **S34**).

[0052] If the current count coincides with the target count (YES in step **S34**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **29** (step

S35), so that the motor **30** stops rotation. Hence, the left side separator **61** automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Automatic Adjustment of Right Side Separator to Preset Position]

[0053] The CPU **1** then reads the current count of the right side separator position counter **35** (step **S36**), and reads out the target count of the right side separator position counter **35** from the memory **M6** (step **S37**). The CPU **1** then checks whether or not the current count coincides with the target count (step **S38**).

[0054] If the current count of the right side separator position counter **35** does not coincide with the target count (NO in step **S38**) and is smaller than it (YES in step **S39**), the CPU **1** sends a clockwise rotation instruction to the motor driver **33** (step **S40**). Thus, the motor **34** rotates clockwise, and the right side separator **62** moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0055] During the movement of the right side separator **62**, the CPU **1** reads the current count of the right side separator position counter **35** (step **S41**), and reads out the target count of the right side separator position counter **35** from the memory **M6** (step **S42**). The CPU **1** then repeatedly checks whether or not the current count of the right side separator position counter **35** coincides with the target count (step **S43**).

[0056] If the current count coincides with the target count (YES in step **S43**), the CPU **1** stops outputting the clockwise rotation instruction to the motor driver **33** (step **S44**), so that the motor **34** stops rotation. Hence, the right side separator **62** automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0057] If the current count is larger than the target count (NO in step **S39**), the CPU **1** sends a counterclockwise rotation instruction to the motor driver **33** (step **S45**). Hence, the motor **34** rotates counterclockwise, and the right side separator **62** moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0058] During the movement of the right side separator **62**, the CPU **1** reads the current count of the right side separator position counter **35** (step **S46**), and reads out the target count of the right side separator position counter **35** from the memory **M6** (step **S47**). The CPU **1** then repeatedly checks whether or not the current count of the right side separator position counter **35** coincides with the target count (step **S48**).

[0059] If the current count coincides with the target count (YES in step **S48**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **33** (step **S49**), so that the motor **34** stops rotation. Hence, the right side separator **62** automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Automatic Adjustment of Sucker to Preset Position]

[0060] The CPU **1** then reads the current count of the sucker position counter **39** (step **S50**), and reads out the target count of the sucker position counter **39** from the memory **M9** (step **S51**). The CPU **1** then checks whether or not the current count of the sucker position counter **39** coincides with the target count (step **S52**).

[0061] If the current count does not coincide with the target count (NO in step S52) and is smaller than it (YES in step S53), the CPU 1 sends a clockwise rotation instruction to the motor driver 37 (step S54). Thus, the motor 38 rotates clockwise, and the sucker 63 moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0062] During the movement of the sucker 63, the CPU 1 reads the current count of the sucker position counter 39 (step S55), and reads out the target count of the sucker position counter 39 from the memory M9 (step S56). The CPU 1 then repeatedly checks whether or not the current count of the sucker position counter 39 coincides with the target count (step S57).

[0063] If the current count coincides with the target count (YES in step S57), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 37 (step S58), so that the motor 38 stops rotation. Hence, the sucker 63 automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0064] If the current count is larger than the target count (NO in step S53), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 37 (step S59). Hence, the motor 38 rotates counterclockwise, and the sucker 63 moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0065] During the movement of the sucker 63, the CPU 1 reads the current count of the sucker position counter 39 (step S60), and reads out the target count of the sucker position counter 39 from the memory M9 (step S61). The CPU 1 then repeatedly checks whether or not the current count of the sucker position counter 39 coincides with the target count (step S62).

[0066] If the current count coincides with the target count (YES in step S62), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 37 (step S63), so that the motor 38 stops rotation. Hence, the sucker 63 automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Automatic Adjustment of Suction Wheel to Preset Position]

[0067] The CPU 1 then reads the current count of the suction wheel position counter 43 (step S64), and reads out the target count of the suction wheel position counter 43 from the memory M12 (step S65). The CPU 1 then checks whether or not the current count of the suction wheel position counter 43 coincides with the target count (step S66).

[0068] If the current count does not coincide with the target count (NO in step S66) and is smaller than it (YES in step S67), the CPU 1 sends a clockwise rotation instruction to the motor driver 41 (step S68). Thus, the motor 42 rotates clockwise, and the suction wheel 64 moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0069] During the movement of the suction wheel 64, the CPU 1 reads the current count of the suction wheel position counter 43 (step S69), and reads out the target count of the suction wheel position counter 43 from the memory M12 (step S70). The CPU 1 then repeatedly checks whether or not the current count of the suction wheel position counter 43 coincides with the target count (step S71).

[0070] If the current count coincides with the target count (YES in step S71), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 41 (step S72), so that the motor 42 stops rotation. Hence, the suction wheel 64

automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0071] If the current count of the suction wheel position counter 43 is larger than the target count (NO in step S67), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 41 (step S73). Hence, the motor 42 rotates counterclockwise, and the suction wheel 64 moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0072] During the movement of the suction wheel 64, the CPU 1 reads the current count of the suction wheel position counter 43 (step S74), and reads out the target count of the suction wheel position counter 43 from the memory M12 (step S75). The CPU 1 then repeatedly checks whether or not the current count of the suction wheel position counter 43 coincides with the target count (step S76).

[0073] If the current count coincides with the target count (YES in step S76), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 41 (step S77), so that the motor 42 stops rotation. Hence, the suction wheel 64 automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Automatic Adjustment of Left Side Jogger to Preset Position]

[0074] The CPU 1 then reads the current count of the left side jogger position counter 47 (step S78), and reads out the target count of the left side jogger position counter 47 from the memory M15 (step S79). The CPU 1 then checks whether or not the current count of the left side jogger position counter 47 coincides with the target count (step S80).

[0075] If the current count does not coincide with the target count (NO in step S80) and is smaller than it (YES in step S81), the CPU 1 sends a clockwise rotation instruction to the motor driver 45 (step S82). Thus, the motor 46 rotates clockwise, and the left side jogger 65 moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0076] During the movement of the left side jogger 65, the CPU 1 reads the current count of the left side jogger position counter 47 (step S83), and reads out the target count of the left side jogger position counter 47 from the memory M15 (step S84). The CPU 1 then repeatedly checks whether or not the current count of the left side jogger position counter 47 coincides with the target count (step S85).

[0077] If the current count coincides with the target count (YES in step S85), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 45 (step S86), so that the motor 46 stops rotation. Hence, the left side jogger 65 automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0078] If the current count is larger than the target count (NO in step S81), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 45 (step S87). Hence, the motor 46 rotates counterclockwise, and the left side jogger 65 moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0079] During the movement of the left side jogger 65, the CPU 1 reads the current count of the left side jogger position counter 47 (step S88), and reads out the target count of the left side jogger position counter 47 from the memory M15 (step S89). The CPU 1 then repeatedly checks whether or not the

current count of the left side jogger position counter 47 coincides with the target count (step S90).

[0080] If the current count coincides with the target count (YES in step S90), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 45 (step S91), so that the motor 46 stops rotation. Hence, the left side jogger 65 automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Automatic Adjustment of Right Side Jogger to Preset Position]

[0081] The CPU 1 then reads the current count of the right side jogger position counter 51 (step S92 in FIG. 5H), and reads out the target count of the right side jogger position counter 51 from the memory M16 (step S93). The CPU 1 then checks whether or not the current count of the right side jogger position counter 51 coincides with the target count (step S94).

[0082] If the current count does not coincide with the target count (NO in step S94) and is smaller than it (YES in step S95), the CPU 1 sends a clockwise rotation instruction to the motor driver 49 (step S96). Thus, the motor 50 rotates clockwise, and the right side jogger 66 moves inward (in a direction to approach the center of the sheets stacked on the pile board).

[0083] During the movement of the right side jogger 66, the CPU 1 reads the current count of the right side jogger position counter 51 (step S97), and reads out the target count of the right side jogger position counter 51 from the memory M16 (step S98). The CPU 1 then repeatedly checks whether or not the current count of the right side jogger position counter 51 coincides with the target count (step S99).

[0084] If the current count coincides with the target count (YES in step S99), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 49 (step S100), so that the motor 50 stops rotation. Hence, the right side jogger 66 automatically moves to the preset position obtained in accordance with the sheets size of the printing sheet, and stops there.

[0085] If the current count of the right side jogger position counter 51 is larger than the target count (NO in step S95), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 49 (step S101). Hence, the motor 50 rotates counterclockwise, and the right side jogger 66 moves outward (in a direction to further separate from the center of the sheets stacked on the pile board).

[0086] During the movement of the right side jogger 66, the CPU 1 reads the current count of the right side jogger position counter 51 (step S102), and reads out the target count of the right side jogger position counter 51 from the memory M16 (step S103). The CPU 1 then repeatedly checks whether or not the current count of the right side jogger position counter 51 coincides with the target count (step S104).

[0087] If the current count coincides with the target count (YES in step S104), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 49 (step S105), so that the motor 50 stops rotation. Hence, the right side jogger 66 automatically moves to the preset position obtained in accordance with the sheet size of the printing sheets, and stops there.

[Manual Adjustment of Left Side Separator Position]

[0088] If the operator wants to adjust the position of the left side separator 61, he/she turns on the selection switch 5 (YES

in step S106). If the operator wants to adjust the left side separator 61 inward, he/she turns on the UP button 12 (YES in step S108). If the operator wants to adjust the left side separator 61 outward, he/she turns on the DOWN button 13 (YES in step 112). If the position adjustment of the left side separator 61 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S107). Hence, the selected left side separator position adjustment state ends.

[0089] If the UP button 12 is turned on (YES in step S108), the CPU 1 sends a clockwise rotation instruction to the motor driver 29 (step S109). If the UP button 12 is turned off (YES in step S110), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 29 (step S111). Hence, while the UP button 12 is ON, the motor 30 rotates clockwise, and the left side separator 61 moves inward.

[0090] If the DOWN button 13 is turned on (YES in step S112), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 29 (step S113). If the DOWN button 13 is turned off (YES in step S114), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 29 (step S115). Hence, while the DOWN button 13 is ON, the motor 30 rotates counterclockwise, and the left side separator 61 moves outward.

[Manual Adjustment of Right Side Separator Position]

[0091] If the operator wants to adjust the position of the right side separator 62, he/she turns on the selection switch 6 (YES in step S116). If the operator wants to adjust the right side separator 62 inward, he/she turns on the UP button 12 (YES in step S118). If the operator wants to adjust the right side separator 62 outward, he/she turns on the DOWN button 13 (YES in step 122). If the position adjustment of the right side separator 62 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S117). Hence, the selected right side separator position adjustment state ends.

[0092] If the UP button 12 is turned on (YES in step S118), the CPU 1 sends a clockwise rotation instruction to the motor driver 33 (step S119). If the UP button 12 is turned off (YES in step S120), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 33 (step S121). Hence, while the UP button 12 is ON, the motor 34 rotates clockwise, and the right side separator 62 moves inward.

[0093] If the DOWN button 13 is turned on (YES in step S112), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 33 (step S123). If the DOWN button 13 is turned off (YES in step S124), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 33 (step S125). Hence, while the DOWN button 13 is ON, the motor 34 rotates counterclockwise, and the right side separator 62 moves outward.

[Manual Adjustment of Sucker Position]

[0094] If the operator wants to adjust the position of the sucker 63, he/she turns on the sucker position adjustment selection switch 7 (YES in step S126). If the operator wants to adjust the sucker 63 inward, he/she turns on the UP button 12 (YES in step S128). If the operator wants to adjust the sucker 63 outward, he/she turns on the DOWN button 13 (YES in step 132). If the position adjustment of the sucker 63 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S127). Hence, the selected sucker position adjustment state ends.

[0095] If the UP button 12 is turned on (YES in step S128), the CPU 1 sends a clockwise rotation instruction to the motor driver 37 (step S129). If the UP button 12 is turned off (YES in step S130), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 37 (step S131). Hence, while the UP button 12 is ON, the motor 38 rotates clockwise, and the sucker 63 moves inward.

[0096] If the DOWN button 13 is turned on (YES in step S132), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 37 (step S133). If the DOWN button 13 is turned off (YES in step S134), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 37 (step S135). Hence, while the DOWN button 13 is ON, the motor 38 rotates counterclockwise, and the sucker 63 moves outward.

[Manual Adjustment of Suction Wheel Position]

[0097] If the operator wants to adjust the position of the suction wheel 64, he/she turns on the selection switch 8 (YES in step S136). If the operator wants to adjust the suction wheel 64 inward, he/she turns on the UP button 12 (YES in step S138). If the operator wants to adjust the suction wheel 64 outward, he/she turns on the DOWN button 13 (YES in step S142). If the position adjustment of the suction wheel 64 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S137). Hence, the selected suction wheel position adjustment state ends.

[0098] If the UP button 12 is turned on (YES in step S138), the CPU 1 sends a clockwise rotation instruction to the motor driver 41 (step S139). If the UP button 12 is turned off (YES in step S140), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 41 (step S141). Hence, while the UP button 12 is ON, the motor 42 rotates clockwise, and the suction wheel 64 moves inward.

[0099] If the DOWN button 13 is turned on (YES in step S142), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 41 (step S143). If the DOWN button 13 is turned off (YES in step S144), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 41 (step S145). Hence, while the DOWN button 13 is ON, the motor 42 rotates counterclockwise, and the suction wheel 64 moves outward.

[Manual Adjustment of Left Side Jogger Position]

[0100] If the operator wants to adjust the position of the left side jogger 65, he/she turns on the selection switch 9 (YES in step S146). If the operator wants to adjust the left side jogger 65 inward, he/she turns on the UP button 12 (YES in step S148). If the operator wants to adjust the left side jogger 65 outward, he/she turns on the DOWN button 13 (YES in step S152). If the position adjustment of the left side jogger 65 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S147). Hence, the selected left side jogger position adjustment state ends.

[0101] If the UP button 12 is turned on (YES in step S148), the CPU 1 sends a clockwise rotation instruction to the motor driver 45 (step S149). If the UP button 12 is turned off (YES in step S150), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 45 (step S151). Hence, while the UP button 12 is ON, the motor 46 rotates clockwise, and the left side jogger 65 moves inward.

[0102] If the DOWN button 13 is turned on (YES in step S152), the CPU 1 sends a counterclockwise rotation instruc-

tion to the motor driver 45 (step S153). If the DOWN button 13 is turned off (YES in step S154), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 45 (step S155). Hence, while the DOWN button 13 is ON, the motor 46 rotates counterclockwise, and the left side jogger 65 moves outward.

[Manual Adjustment of Right Side Jogger Position]

[0103] If the operator wants to adjust the position of the right side jogger 66, he/she turns on the selection switch 10 (YES in step S156). If the operator wants to adjust the right side jogger 66 inward, he/she turns on the UP button 12 (YES in step S158). If the operator wants to adjust the right side jogger 66 outward, he/she turns on the DOWN button 13 (YES in step S162). If the position adjustment of the right side jogger 66 is completed, the operator turns on the position adjustment completion switch 11 (YES in step S157). Hence, the selected right side jogger position adjustment state ends.

[0104] If the UP button 12 is turned on (YES in step S158), the CPU 1 sends a clockwise rotation instruction to the motor driver 49 (step S159). If the UP button 12 is turned off (YES in step S160), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 49 (step S161). Hence, while the UP button 12 is ON, the motor 50 rotates clockwise, and the right side jogger 66 moves inward.

[0105] If the DOWN button 13 is turned on (YES in step S162), the CPU 1 sends a counterclockwise rotation instruction to the motor driver 49 (step S163). If the DOWN button 13 is turned off (YES in step S164), the CPU 1 stops outputting the counterclockwise rotation instruction to the motor driver 49 (step S165). Hence, while the DOWN button 13 is ON, the motor 50 rotates counterclockwise, and the right side jogger 66 moves outward.

[Feed Unit]

[0106] Through the processing operation of steps S1 to S165 described above, as shown in FIG. 3A, the positions of the left side separator 61, right side separator 62, and sucker 63 are adjusted in accordance with the sheet size of printing sheets 302 on a pile board (feeder pile) 301 of the feed unit, and after that printing is performed. During printing, as the sheets 302 are fed and decrease, the pile board 301 is lifted automatically.

[0107] When the printing sheets 302 on the pile board 301 are consumed, the operator manipulates the lowering button 17 to lower the feeder pile 301. New printing sheets 302 are stacked on the feeder pile 301 that has been lowered to the lowermost end. At this time, the preset positions of the left side separator 61, right side separator 62, and sucker 63 may fall inside the sheet size of the printing sheets 302 due to a cutting error of the printing sheets 302, misalignment of the printing sheets 302 during stacking, or the like. FIG. 3B shows a case in which the distal end of the leveling foot 306 falls inside the sheet size of the printing sheets 302 on the feeder pile 301.

[0108] In such a case, conventionally, the feeder pile 301 is lifted by push button operation. As a consequence, the printing sheets 302 in the uppermost portion on the feeder pile 301 knock up the leveling foot 306 to break it. The left side separator 61 and right side separator 62 are also broken as they are knocked up in the same manner.

[0109] According to this embodiment, when lifting the feeder pile 301 by push button operation, control takes place

so that the left side separator **61**, right side separator **62**, and sucker **63** automatically move in a direction (outward) to further separate from the center of the printing sheets **302** on the feeder pile **301**, as will be described later.

[Processing Operation When Lifting Feeder Pile by Manual Operation]

[0110] When lifting the feeder pile **301** manually, the operator turns on the selection switch **14** (YES in step **S166**). Subsequently, the operator turns on the lifting button **16** (YES in step **S168**). To stop the selected feeder pile lifting or lowering state after the selection switch **14** is turned on, the operator turns on the position adjustment completion switch **11** (YES in step **S167**).

[Home Position and Retreat Position of Left Side Separator]

[0111] If the lifting button **16** is turned on (YES in step **S168**), the CPU **1** reads the current count of the left side separator position counter **31**, and stores the readout count in the memory **M23** as the left side separator home position (step **S169**). Then, the CPU **1** calculates the current position of the left side separator on the basis of the readout current count of the left side separator position counter **31**, and stores it in the memory **M24** (step **S170**).

[0112] The CPU **1** then reads out a predetermined side separator clearance amount α_1 from the memory **M25** (step **S171**). The CPU **1** then obtains the left side separator retreat position by subtracting the side separator clearance amount α_1 from the left side separator current position, and stores it in the memory **M26** (step **S172**). The CPU **1** then calculates the target count of the left side separator position counter **31** on the basis of the obtained left side separator retreat position, and stores it in the memory **M5** (step **S173**).

[Home Position and Retreat Position of Right Side Separator]

[0113] The CPU **1** then reads the current count of the right side separator position counter **35**, and stores the readout count in the memory **M27** as the right side separator home position (step **S174**). Then, the CPU **1** calculates the current position of the right side separator on the basis of the readout current count of the right side separator position counter **35**, and stores it in the memory **M28** (step **S175**).

[0114] The CPU **1** then reads out the predetermined side separator clearance amount α_1 from the memory **M25** (step **S176**). The CPU **1** then obtains the right side separator retreat position by subtracting the side separator clearance amount α_1 from the right side separator current position, and stores it in the memory **M29** (step **S177**). The CPU **1** then calculates the target count of the right side separator position counter **35** on the basis of the obtained right side separator retreat position, and stores it in the memory **M6** (step **S178**).

[Home Position and Retreat Position of Sucker]

[0115] The CPU **1** then reads the current count of the sucker position counter **39**, and stores the readout count in the memory **M30** as the sucker home position (step **S179**). Then, the CPU **1** calculates the current position of the sucker on the basis of the readout current count of the sucker position counter **39**, and stores it in the memory **M31** (step **S180**).

[0116] The CPU **1** then reads out a predetermined sucker clearance amount α_2 from the memory **M32** (step **S181**). The CPU **1** then obtains the sucker retreat position by subtracting the sucker clearance amount α_2 from the sucker current posi-

tion, and stores it in the memory **M33** (step **S182**). The CPU **1** then calculates the target count of the sucker position counter **39** on the basis of the obtained sucker retreat position, and stores it in the memory **M9** (step **S183**).

[Movement of Left Side Separator to Retreat Position]

[0117] Then, the CPU **1** turns off the air valves **25** and **26** (step **S184**) to disconnect air supply to the left side separator **61**, right side separator **62**, and sucker **63**. The CPU **1** then sends a counterclockwise rotation instruction to the motor driver **29** (step **S185**). Hence, the motor **30** rotates counterclockwise, and the left side separator **61** moves outward.

[0118] During the movement of the left side separator **61**, the CPU **1** reads the current count of the left side separator position counter **31** (step **S186**), and reads out the target count of the left side separator position counter **31** from the memory **M5** (step **S187**). The CPU **1** then repeatedly checks whether or not the current count of the left side separator position counter **31** coincides with the target count (step **S188**).

[0119] If the current count coincides with the target count (YES in step **S188**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **29** (step **S189**), so that the motor **30** stops rotation. Hence, the left side separator **61** automatically moves outward to the left side separator retreat position obtained from the side separator clearance amount α_1 , that is, by the side separator clearance amount α_1 from the current position (preset position), and stops there.

[Movement of Right Side Separator to Retreat Position]

[0120] Then, the CPU **1** sends a counterclockwise rotation instruction to the motor driver **33** (step **S109**). Hence, the motor **34** rotates counterclockwise, and the right side separator **62** moves outward.

[0121] During the movement of the right side separator **62**, the CPU **1** reads the current count of the right side separator position counter **35** (step **S191**), and reads out the target count of the right side separator position counter **35** from the memory **M6** (step **S192**). The CPU **1** then repeatedly checks whether or not the current count of the right side separator position counter **35** coincides with the target count (step **S193**).

[0122] If the current count coincides with the target count (YES in step **S193**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **33** (step **S194**), so that the motor **34** stops rotation. Hence, the right side separator **62** automatically moves outward to the right side separator retreat position obtained from the side separator clearance amount α_1 , that is, by the side separator clearance amount α_1 from the current position (preset position), and stops there.

[Movement of Sucker to Retreat Position]

[0123] Then, the CPU **1** sends a counterclockwise rotation instruction to the motor driver **37** (step **S195**). Hence, the motor **38** rotates counterclockwise, and the sucker **63** moves outward.

[0124] During the movement of the sucker **63**, the CPU **1** reads the current count of the sucker position counter **39** (step **S196**), and reads out the target count of the sucker position counter **39** from the memory **M9** (step **S197**). The CPU **1** then

repeatedly checks whether or not the current count of the sucker position counter **39** coincides with the target count (step **S198**).

[0125] If the current count coincides with the target count (YES in step **S198**), the CPU **1** stops outputting the counter-clockwise rotation instruction to the motor driver **37** (step **S199**), so that the motor **38** stops rotation. Hence, the sucker **63** automatically moves outward to the sucker retreat position obtained from the sucker clearance amount $\alpha 2$, that is, by the sucker clearance amount $\alpha 2$ from the current position (preset position), and stops there.

[0126] According to this embodiment, when the operator turns on the lifting button **16**, the left side separator **61**, right side separator **62**, and sucker **63** automatically clear outside the sheet size of the printing sheets **302** on the feeder pile **301**, as shown in FIG. **3C**. Hence, the printing sheets **302** on the feeder pile **301** do not knock up the leveling foot **306**, left side separator **61**, and right side separator **62**, so that they are prevented from being broken.

[0127] According to this embodiment, the side separator clearance amount $\alpha 1$ and the sucker clearance amount $\alpha 2$ are set to fall within a range of several mm to ten-odd mm. The clearance amounts $\alpha 1$ and $\alpha 2$ are preferably as small as possible when considering the cutting error of the sheets **302**, misalignment of the sheets **302** during stacking, or the like.

[Determination on Lifting Completion of Feeder Pile]

[0128] When the feeder pile **301** reaches a desired lifted position, the operator turns off the lifting button **16**. When the lifting button **16** is turned off (YES in step **S200**), the CPU **1** outputs a reset signal and enable signal to the internal clock counter **24** (step **S201**), and stops outputting the reset signal to the internal clock counter **24** (step **S202**). Hence, the internal clock counter **24** starts counting from "0".

[0129] While the lifting button **16** is OFF (NO in step **S203**), the CPU **1** reads the count of the internal clock counter **24** (step **S204**). The CPU **1** calculates the time that has elapsed since the lifting button **16** is turned off from the readout count (step **S205**). The CPU **1** then reads out a predetermined feeder pile standby time t_{wA} from the memory **M36** (step **S206**). The CPU **1** then checks whether or not the time that has elapsed since the lifting button **16** is turned off reaches the feeder pile standby time t_{wA} (step **S207**).

[0130] If the lifting button **16** is turned on before the lapse time reaches the standby time t_{wA} (YES in step **S203**), the process returns to step **S200**, and it waits for the lifting button **16** to be turned off again. More specifically, the lifting button **16** may be turned on before the standby time t_{wA} is reached so that fine adjustment of the height position of the feeder pile **301** and the like can be performed. In this case, the time elapsed since the lifting button **16** is turned off is counted again.

[0131] If the lapse time reaches the feeder pile standby time t_{wA} , that is, if the lifting button **16** is kept OFF during the standby time t_{wA} , the CPU **1** determines that lifting of the feeder pile **301** is completed (YES in step **S207**).

[Read Out of Home Positions of Left Side Separator, Right Side Separator, and Sucker]

[0132] If lifting of the feeder pile **301** is completed (YES in step **S207**), the CPU **1** reads out the left side separator home position from the memory **M23** (step **S208**), and overwrites it in the memory **M5** as the target count of the left side separator

position counter **31** (step **S209**). The CPU **1** then reads out the right side separator home position from the memory **M27** (step **S210**), and overwrites it in the memory **M6** as the target count of the right side separator position counter **35** (step **S211**). The CPU **1** then reads out the sucker home position from the memory **M30** (step **S212**), and overwrites it in the memory **M9** as the target count of the sucker position counter **39** (step **S213**).

[Movement of Left Side Separator to Home Position]

[0133] Then, the CPU **1** sends a clockwise rotation instruction to the motor driver **29** (step **S214**). Hence, the motor **30** rotates clockwise, and the left side separator **61** moves inward.

[0134] During the movement of the left side separator **61**, the CPU **1** reads the current count of the left side separator position counter **31** (step **S215**), and reads out the target count of the left side separator position counter **31** from the memory **M5** (step **S216**). The CPU **1** then repeatedly checks whether or not the current count of the left side separator position counter **31** coincides with the target count (step **S217**).

[0135] If the current count coincides with the target count (YES in step **S217**), the CPU **1** stops outputting the clockwise rotation instruction to the motor driver **29** (step **S218**), so that the motor **30** stops rotation. Hence, the left side separator **61** automatically moves to the initial position (preset position) where it has been before the feeder pile **301** is lifted, and stops there.

[Movement of Right Side Separator to Home Position]

[0136] Then, the CPU **1** sends a clockwise rotation instruction to the motor driver **33** (step **S219**). Hence, the motor **34** rotates clockwise, and the right side separator **62** moves inward.

[0137] During the movement of the right side separator **62**, the CPU **1** reads the current count of the right side separator position counter **35** (step **S220**), and reads out the target count of the right side separator position counter **35** from the memory **M6** (step **S221**). The CPU **1** then repeatedly checks whether or not the current count of the right side separator position counter **35** coincides with the target count (step **S222**).

[0138] If the current count coincides with the target count (YES in step **S222**), the CPU **1** stops outputting the clockwise rotation instruction to the motor driver **33** (step **S223**), so that the motor **34** stops rotation. Hence, the right side separator **62** automatically moves to the initial position (preset position) where it has been before the feeder pile **301** is lifted, and stops there.

[Movement of Sucker to Home Position]

[0139] Then, the CPU **1** sends a clockwise rotation instruction to the motor driver **37** (step **S224**). Hence, the motor **38** rotates clockwise, and the sucker **63** moves inward.

[0140] During the movement of the sucker **63**, the CPU **1** reads the current count of the sucker position counter **39** (step **S225**), and reads out the target count of the sucker position counter **39** from the memory **M9** (step **S226**). The CPU **1** then repeatedly checks whether or not the current count of the sucker position counter **39** coincides with the target count (step **S227**).

[0141] If the current count coincides with the target count (YES in step **S227**), the CPU **1** stops outputting the clockwise

rotation instruction to the motor driver 37 (step S228), so that the motor 38 stops rotation. Hence, the sucker 63 automatically moves to the initial position (preset position) where it has been before the feeder pile 301 is lifted, and stops there.

[0142] According to this embodiment, when lifting of the feeder pile 301 is completed, the left side separator 61, right side separator 62, and sucker 63 automatically return to the initial positions (preset positions) where they have been before the feeder pile 301 is lifted. In this case, if the clearance amounts $\alpha 1$ and $\alpha 2$ are minimized as much as possible, the time taken until the left side separator 61, right side separator 62, and sucker 63 return to the initial positions (preset positions) can be shortened.

[0143] During movement to the home positions, the leveling foot 306 may fall inside the sheet size of the printing sheets 302 on the feeder pile 301, as shown in FIG. 3D. In this case, the leveling foot 306 returns to the initial position from the side of the printing sheets 302 and abuts against the side wall of the printing sheets 302. At this time, the printing sheets 302 are shifted in the widthwise direction to absorb the impact force of the leveling foot 306. Thus, the leveling foot 306 will not be broken.

[Start of Feeding]

[0144] After the left side separator 61, right side separator 62, and sucker 63 are returned to the initial positions (preset positions) where they have been before the feeder pile 301 is lifted, the CPU 1 checks whether or not the feed start switch 18 is ON (step S229). If the feed start switch 18 is ON, the CPU 1 turns on the air valves 25 and 26 (step S230) to start air supply to the left side separator 61, right side separator 62, and sucker 63. Hence, the feed operation is resumed.

[Delivery Unit]

[0145] The operation of the delivery unit will be described hereinafter. Through the processing operation of steps S1 to S165 described above, as shown in FIG. 4A, printing sheets 402 stacked on a pile board (delivery pile) 401 of the delivery unit are printed while the suction wheel 64, left side jogger 65, and right side jogger 66 are adjusted at positions corresponding to the sheet size of the printing sheets 402. During printing, as the printing sheets 402 that are dropped and stacked by delivery increase, the delivery pile 401 is lowered automatically.

[Processing Operation When Lifting Delivery Pile by Manual Operation]

[0146] When lifting the delivery pile 401 manually, the operator turns on the selection switch 15 (YES in step S231). Subsequently, the operator turns on the lifting button 16 (YES in step S233). To stop the selected delivery pile lifting or lowering state after the selection switch 15 is turned on, the operator turns on the position adjustment completion switch 11 (YES in step S232).

[Home Position and Retreat Position of Suction Wheel]

[0147] If the lifting button 16 is turned on (YES in step S233), the CPU 1 reads the current count of the suction wheel position counter 43, and stores the readout count in the memory M37 as the suction wheel home position (step S234). Then, the CPU 1 calculates the current position of the suction

wheel on the basis of the readout current count of the suction wheel position counter 43, and stores it in the memory M38 (step S235).

[0148] The CPU 1 then reads out a predetermined suction wheel clearance amount $\beta 1$ from the memory M39 (step S236). The CPU 1 then obtains the suction wheel retreat position by subtracting the suction wheel clearance amount $\beta 1$ from the suction wheel current position, and stores it in the memory M40 (step S237). The CPU 1 then calculates the target count of the suction wheel position counter 43 on the basis of the obtained suction wheel retreat position, and stores it in the memory M12 (step S238).

[Home Position and Retreat Position of Left Side Jogger]

[0149] The CPU 1 then reads the current count of the left side jogger position counter 47, and stores the readout count in the memory M41 as the left side jogger home position (step S239). Then, the CPU 1 calculates the current position of the left side jogger on the basis of the readout current count of the left side jogger position counter 47, and stores it in the memory M42 (step S240 in FIG. 5V).

[0150] The CPU 1 then reads out a predetermined side jogger clearance amount $\beta 2$ from the memory M43 (step S241). The CPU 1 then obtains the left side jogger retreat position by subtracting the side jogger clearance amount $\beta 2$ from the left side jogger current position, and stores it in the memory M44 (step S242). The CPU 1 then calculates the target count of the left side jogger position counter 47 on the basis of the obtained left side jogger retreat position, and stores it in the memory M15 (step S243).

[Home Position and Retreat Position of Right Side Jogger]

[0151] The CPU 1 then reads the current count of the right side jogger position counter 51, and stores the readout count in the memory M45 as the right side jogger home position (step S244). Then, the CPU 1 calculates the current position of the right side jogger on the basis of the readout current count of the right side jogger position counter 51, and stores it in the memory M46 (step S245).

[0152] The CPU 1 then reads out the predetermined side jogger clearance amount $\beta 2$ from the memory M43 (step S246). The CPU 1 then obtains the right side jogger retreat position by subtracting the right side jogger clearance amount $\beta 2$ from the right side jogger current position, and stores it in the memory M47 (step S247). The CPU 1 then calculates the target count of the right side jogger position counter 51 on the basis of the obtained right side jogger retreat position, and stores it in the memory M16 (step S248).

[Movement of Suction Wheel to Retreat Position]

[0153] Then, the CPU 1 sends a counterclockwise rotation instruction to the motor driver 41 (step S249). Hence, the motor 42 rotates counterclockwise, and the suction wheel 64 moves outward.

[0154] During the movement of the suction wheel 64, the CPU 1 reads the current count of the suction wheel position counter 43 (step S250), and reads out the target count of the suction wheel position counter 43 from the memory M12 (step S251). The CPU 1 then repeatedly checks whether or not the current count of the suction wheel position counter 43 coincides with the target count (step S252).

[0155] If the current count coincides with the target count (YES in step S252), the CPU 1 stops outputting the counter-

clockwise rotation instruction to the motor driver **41** (step **S253**), so that the suction wheel position adjustment motor **42** stops rotation. Hence, the suction wheel **64** automatically moves outward to the suction wheel retreat position obtained from the suction wheel clearance amount $\beta 1$, that is, by the suction wheel clearance amount $\beta 1$ from the current position (preset position), and stops there.

[Movement of Left Side Jogger to Retreat Position]

[0156] Then, the CPU **1** sends a counterclockwise rotation instruction to the motor driver **45** (step **S254**). Hence, the motor **46** rotates counterclockwise, and the left side jogger **65** moves outward.

[0157] During the movement of the left side jogger **65**, the CPU **1** reads the current count of the left side jogger position counter **47** (step **S255**), and reads out the target count of the left side jogger position counter **47** from the memory **M15** (step **S256**). The CPU **1** then repeatedly checks whether or not the current count of the left side jogger position counter **47** coincides with the target count (step **S257**).

[0158] If the current count coincides with the target count (YES in step **S257**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **45** (step **S258**), so that the motor **46** stops rotation. Hence, the left side jogger **65** automatically moves outward to the left side jogger retreat position obtained from the side jogger clearance amount $\beta 2$, that is, by the side jogger clearance amount $\beta 2$ from the current position (preset position), and stops there.

[Movement of Right Side Jogger to Retreat Position]

[0159] Then, the CPU **1** sends a counterclockwise rotation instruction to the motor driver **49** (step **S259**). Hence, the motor **50** rotates counterclockwise, and the right side jogger **66** moves outward.

[0160] During the movement of the right side jogger **66**, the CPU **1** reads the current count of the right side jogger position counter **51** (step **S260**), and reads out the target count of the right side jogger position counter **51** from the memory **M16** (step **S261**). The CPU **1** then repeatedly checks whether or not the current count of the right side jogger position counter **51** coincides with the target count (step **S262**).

[0161] If the current count coincides with the target count (YES in step **S262**), the CPU **1** stops outputting the counterclockwise rotation instruction to the motor driver **49** (step **S263**), so that the motor **50** stops rotation. Hence, the right side jogger **66** automatically moves outward to the right side jogger retreat position obtained from the side jogger clearance amount $\beta 2$, that is, by the side jogger clearance amount $\beta 2$ from the current position (preset position), and stops there.

[0162] According to this embodiment, when the operator turns on the lifting button **16**, the suction wheel **64**, left side jogger **65**, and right side jogger **66** automatically clear outside the sheet size of the printing sheets **402** on the delivery pile **401**, as shown in FIG. **4C**. Hence, the printing sheets **402** on the delivery pile **401** do not knock up the suction wheel **64**, left side jogger **65**, and right side jogger **66**, so that they are prevented from being broken.

[0163] According to this embodiment, the suction wheel clearance amount $\beta 1$ and the side jogger clearance amount $\beta 2$ are set to fall within a range of several mm to ten-odd mm. The clearance amounts $\beta 1$ and $\beta 2$ are preferably as small as pos-

sible when considering the curl of the respective sides of the printing sheet **402** due to the ink thickness and paper characteristics, or the like.

[Determination on Lifting Completion of Delivery Pile]

[0164] When the delivery pile **401** reaches a desired lifted position, the operator turns off the lifting button **16**. When the lifting button **16** is turned off (YES in step **S264**), the CPU **1** outputs a reset signal and enable signal to the internal clock counter **24** (step **S265**), and stops outputting the reset signal to the internal clock counter **24** (step **S266**). Hence, the internal clock counter **24** starts counting from "0".

[0165] While the lifting button **16** is OFF (NO in step **S267**), the CPU **1** reads the count of the internal clock counter **24** (step **S268**). The CPU **1** calculates the time that has elapsed since the lifting button **16** is turned off from the readout count (step **S269**). The CPU **1** then reads out a predetermined delivery pile standby time twB from the memory **M48** (step **S270**). The CPU **1** then checks whether or not the time that has elapsed since the lifting button **16** is turned off reaches the delivery pile standby time twB (step **S271**).

[0166] If the lifting button **16** is turned on before the lapse time reaches the standby time twB (YES in step **S267**), the process returns to step **S264**, and it waits for the lifting button **16** to be turned off again. More specifically, the lifting button **16** may be turned on before the standby time twB is reached so that fine adjustment of the height position of the delivery pile **401** and the like can be performed. In this case, the time elapsed since the lifting button **16** is turned off is counted again.

[0167] If the lapse time reaches the delivery pile standby time twB , that is, if the lifting button **16** is kept OFF during the standby time twB , the CPU **1** determines that lifting of the delivery pile **401** is completed (YES in step **S271**).

[Read Out of Home Positions of Suction Wheel, Left Side Jogger, and Right Side Jogger]

[0168] If lifting of the delivery pile **401** is completed (YES in step **S271**), the CPU **1** reads out the suction wheel home position from the memory **M37** (step **S272**), and overwrites it in the memory **M12** as the target count of the suction wheel position counter **43** (step **S273**). The CPU **1** then reads out the left side jogger home position from the memory **M41** (step **S274**), and overwrites it in the memory **M15** as the target count of the left side jogger position counter **31** (step **S275**). The CPU **1** then reads out the right side jogger home position from the memory **M45** (step **S276**), and overwrites it in the memory **M16** as the target count of the right side jogger position counter **35** (step **S277**).

[Movement of Suction Wheel to Home Position]

[0169] Then, the CPU **1** sends a clockwise rotation instruction to the motor driver **41** (step **S278**). Hence, the motor **42** rotates clockwise, and the suction wheel **64** moves inward.

[0170] During the movement of the suction wheel **64**, the CPU **1** reads the current count of the suction wheel position counter **43** (step **S279**), and reads out the target count of the suction wheel position counter **43** from the memory **M12** (step **S280**). The CPU **1** then repeatedly checks whether or not the current count of the suction wheel position counter **43** coincides with the target count (step **S281**).

[0171] If the current count coincides with the target count (YES in step **S281**), the CPU **1** stops outputting the clockwise

rotation instruction to the motor driver 41 (step S282), so that the motor 42 stops rotation. Hence, the suction wheel 64 automatically moves to the initial position (preset position) where it has been before the delivery pile 401 is lifted, and stops there.

[Movement of Left Side Jogger to Home Position]

[0172] Then, the CPU 1 sends a clockwise rotation instruction to the motor driver 45 (step S283). Hence, the motor 46 rotates clockwise, and the left side jogger 65 moves inward.

[0173] During the movement of the left side jogger 65, the CPU 1 reads the current count of the left side jogger position counter 47 (step S284 in FIG. 5Z), and reads out the target count of the left side jogger position counter 47 from the memory M15 (step S285). The CPU 1 then repeatedly checks whether or not the current count of the left side jogger position counter 47 coincides with the target count (step S286).

[0174] If the current count coincides with the target count (YES in step S286), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 45 (step S287), so that the motor 46 stops rotation. Hence, the left side jogger 65 automatically moves to the initial position (preset position) where it has been before the delivery pile 401 is lifted, and stops there.

[Movement of Right Side Jogger to Home Position]

[0175] Then, the CPU 1 sends a clockwise rotation instruction to the motor driver 49 (step S288). Hence, the motor 50 rotates clockwise, and the right side jogger 66 moves inward.

[0176] During the movement of the right side jogger 66, the CPU 1 reads the current count of the right side jogger position counter 51 (step S289), and reads out the target count of the right side jogger position counter 51 from the memory M16 (step S290). The CPU 1 then repeatedly checks whether or not the current count of the right side jogger position counter 51 coincides with the target count (step S291).

[0177] If the current count coincides with the target count (YES in step S291), the CPU 1 stops outputting the clockwise rotation instruction to the motor driver 49 (step S292), so that the motor 50 stops rotation. Hence, the right side jogger 66 automatically moves to the initial position (preset position) where it has been before the delivery pile 401 is lifted, and stops there.

[0178] According to this embodiment, when lifting of the delivery pile 401 is completed, the suction wheel 64, left side jogger 65, and right side jogger 66 automatically return to the initial positions (preset positions) where they have been before the delivery pile 401 is lifted. In this case, if the clearance amounts β_1 and β_2 are minimized as much as possible, the time taken until the suction wheel 64, left side jogger 65, and right side jogger 66 return to the initial positions (preset positions) can be shortened.

[0179] During movement to the home positions, the suction wheel 64 may fall inside the sheet size of the printing sheets 402 on the delivery pile 401, as shown in FIG. 4D. In this case, the suction wheel 64 returns to the initial position from the side of the printing sheets 402 on the delivery pile 401 and abuts against the printing sheets 402. At this time, the printing sheets 402 are shifted backward to absorb the impact force of the suction wheel 64. Thus, the suction wheel 64 will not be broken.

Second Embodiment

[0180] FIG. 6 shows a position adjusting apparatus for an adjustment target portion in a sheet processing machine

according to the second embodiment of the present invention. A position adjusting apparatus 200 according to this embodiment comprises, in addition to the apparatus of the first embodiment, a feeder pile lifting relay 53 for manual operation and a delivery pile lifting relay 54. The relays 53 and 54 are connected to a CPU 101 via an interface 28-10. In the second embodiment, the selection switches 14 and 15, lifting button 16, and lowering button 17 of the apparatus of the first embodiment are omitted.

[0181] According to this embodiment, the feeder pile lifting relay 53 is turned on/off in synchronism with the manual operation of a lifting button 55. When the lifting button 55 is turned on, a coil FU of the feeder pile lifting relay 53 is energized. This turns on relay contacts FS1 and FS2, and a motor FM rotates clockwise to lift a feeder pile 301.

[0182] The CPU 101 fetches the ON states of the relay contacts FS1 and FS2, which are effected by energizing the coil FU of the feeder pile lifting relay 53, as an ON output from the feeder pile lifting relay 53 through the interface 28-10. In this case, the feeder pile lifting relay 53 serves as a detector that detects lifting of the feeder pile 301 effected when the lifting button 55 is turned on.

[0183] The delivery pile lifting relay 54 is turned on/off in synchronism with the manual operation of a lifting button 56. When the lifting button 56 is turned on, a coil DU of the delivery pile lifting relay 54 is energized. This turns on relay contacts DS1 and DS2, and a motor DM rotates clockwise to lift a delivery pile 401.

[0184] The CPU 101 fetches the ON states of the relay contacts DS1 and DS2, which are effected by energizing the coil DU of the delivery pile lifting relay 54, as an ON output from the lifting relay 54 via the interface 28-10. In this case, the delivery pile lifting relay 54 serves as a detector that detects lifting of the delivery pile 401 effected when the lifting button 56 is turned on.

[0185] As shown in FIG. 7, relay contacts LS1 and LS2 to automatically lift the feeder pile 301 are connected to the current supply path to the motor FM. During feed operation, the feeder pile 301 is automatically lifted by the ON/OFF operation of the relay contacts LS1 and LS2. If the sucker or side separators are erroneously moved during automatic lifting of the feeder pile 301, sheets cannot be fed. In the feed unit, the sucker or side separators move outward only when the feeder pile 301 is lifted by manual operation.

[0186] In the delivery unit, the delivery pile 401 is not automatically lifted during printing. The delivery pile 401 is automatically lifted, only after printing sheets 402 are removed from the delivery pile 401, when the empty delivery pile 401 is to be automatically lifted. Hence, in the delivery unit, the suction wheel or side joggers may always be moved outside the sheet size not only when the lifting button 56 is turned on but whenever the delivery pile 401 is to be lifted regardless of whether the operation is manual or automatic.

[0187] The CPU 101 is connected to a memory unit 127. When compared to the memory unit 27 shown in FIG. 2, the memory unit 127 further comprises a memory M49 which stores a side separator retreat position, and a memory M50 which stores a side jogger retreat position. In the memory unit 127, the memories M24, M26, M28, M29, M31, M38, M42, M44, M46, and M47 of the memory unit 27 shown in FIG. 2 are omitted.

[0188] Position adjustment operation for the adjustment target portion performed by the CPU 101 will be described with reference to FIGS. 10A to 10J. According to this

embodiment, the processing operation up to step S466 in FIG. 10A is the same as the processing operation of steps S1 (FIG. 5A) to S165 (FIG. 5N) described in the first embodiment, and accordingly it will not be shown or described repeatedly. The processing operation following step S559 in FIG. 10J is the same as the processing operation of steps S272 (FIG. 5Y) to S292 (FIG. 5Z) described in the first embodiment, and accordingly it will not be shown or described repeatedly.

[0189] When lifting the feeder pile 301 by manual operation, the operator turns on the lifting button 55. This energizes the coil FU of the feeder pile lifting relay 53 to turn on the relay contacts FS1 and FS2. Hence, the motor FM rotates clockwise, and the feeder pile 301 starts to be lifted.

[0190] If an output from the feeder pile lifting relay 53 is turned on (YES in step S466), the CPU 101 reads the current count of a left side separator position counter 31, and stores the readout count in a memory M23 as a left side separator home position (step S467). The CPU 101 then reads the current count of a right side separator position counter 35, and stores it in a memory M27 as a right side separator home position (step S468).

[0191] Then, the CPU 101 reads out the side separator preset position from a memory M4 (step S469) and a predetermined side separator clearance amount $\alpha 1$ from a memory M25 (step S470). The CPU 101 then obtains a side separator retreat position by subtracting the side separator clearance amount $\alpha 1$ from the side separator preset position, and stores it in the memory M49 (step S471).

[0192] Then, the CPU 101 calculates the target counts of the side separator position counters from the side separator retreat position, and stores them in memories MS and M6 (step S472). The memory MS stores the target count of the left side separator position counter 31, and the memory M6 stores the target count of the right side separator position counter 35.

[0193] Then, the CPU 101 reads the current count of a sucker position counter 39, and stores the readout count in a memory M30 as a sucker home position (step S473). The CPU 101 then reads out a sucker preset position from a memory M8 (step S474).

[0194] Then, the CPU 101 performs the processes of steps S475 to S493 corresponding to steps S181 to S199.

[0195] If the output from the feeder pile lifting relay 53 is turned off (YES in step S494), the CPU 101 outputs a reset signal and enable signal to an internal clock counter 24 (step S495), and stops outputting the reset signal to the internal clock counter 24 (step S496). Hence, the internal clock counter 24 starts counting from "0".

[0196] If an output from the feeder pile lifting relay 53 is OFF (NO in step S497), the CPU 101 performs steps S498 to S524 corresponding to steps S204 to S230.

[0197] If an output from the delivery pile lifting relay 54 is ON (YES in step S525), the CPU 101 reads the current count of a suction wheel position counter 43, and stores the readout count in a memory M37 as a suction wheel home position (step S526).

[0198] Then, the CPU 101 reads out a suction wheel preset position from a memory M11 (step S527) and a predetermined suction wheel clearance amount $\beta 1$ from a memory M39 (step S528). The CPU 101 then obtains a suction wheel retreat position by subtracting the suction wheel clearance amount $\beta 1$ from the suction wheel preset position, and stores it in a memory M40 (step S529). The CPU 101 then calculates

the target count of the suction wheel position counter 43 from the suction wheel retreat position, and stores it in a memory M12 (step S530).

[0199] Then, the CPU 101 reads the current count of a left side jogger position counter 47 and stores the readout count in a memory M41 as a left side jogger home position (step S531). The CPU 101 then reads the current count of a right side jogger position counter 51 and stores the readout count in a memory M45 as a right side jogger home position (step S532).

[0200] Then, the CPU 101 reads out a side jogger preset position from a memory M14 (step S533) and a predetermined side jogger clearance amount $\beta 2$ from a memory M43 (step S534). The CPU 101 then obtains a side jogger retreat position by subtracting the side jogger clearance amount $\beta 2$ from the side jogger preset position, and stores it in the memory M50 (step S535).

[0201] The CPU 101 calculates the target counts of the side jogger position counters from the obtained side jogger retreat position, and stores them in memories M15 and M16 (step S536). In this case, the memory M15 stores the target count of the left side jogger position counter 47, and the memory M16 stores the target count of the right side jogger position counter 51.

[0202] Then, the CPU 101 performs the processes of steps S537 to S551 corresponding to steps S249 to S263.

[0203] If the output from the delivery pile lifting relay 54 is turned off (YES in step S552), the CPU 101 outputs a reset signal and enable signal to the internal clock counter 24 (step S553), and stops outputting the reset signal to the internal clock counter 24 (step S554). Hence, the internal clock counter 24 starts counting from "0".

[0204] If the output from the delivery pile lifting relay 54 is OFF (NO in step S555), the CPU 101 reads the count of the internal clock counter 24 (step S556). The CPU 101 then calculates the lapse time since the output from the delivery pile lifting relay 54 is turned off from the readout count (step S557). The CPU 101 then reads out a predetermined delivery pile standby time twB from the memory M48 (step S558), and checks whether or not the lapse time reaches the delivery pile standby time twB (step S559).

[0205] If the output from the delivery pile lifting relay 54 is turned on before the lapse time reaches the delivery pile standby time twB (YES in step S555), the process returns to step S552, and it waits for the output from the delivery pile lifting relay 54 to be turned off again.

[0206] If the lapse time reaches the delivery pile standby time twB , that is, if the output from the delivery pile lifting relay 54 stays OFF during the delivery pile standby time twB , the CPU 101 determines that lifting of the delivery pile 401 is completed (YES in step S559).

[0207] If lifting of the delivery pile 401 is completed (YES in step S559), the CPU 101 shifts to the processing operation of steps S272 to S292 (FIGS. 5Z and 5Y) according to the first embodiment.

[0208] As has been described above, according to the present invention, the adjustment target portion is moved to be located outside the sheet size of the sheets on the pile board. This can prevent the sheets on the pile board from knocking up the adjustment target portion, thus preventing the adjustment target portion from being broken.

[0209] According to the present invention, the sucker and side separators of the feed unit are defined as the adjustment target portion. In the feed unit, as the sheets are fed and thus

decrease, the pile board is lifted automatically. If the sucker and side separators are moved outward every time this automatic lifting takes place, the sheets cannot be fed. In view of this, in the feed unit, the adjustment target portion is not moved when the pile board is lifted automatically, and is moved only when the pile board is lifted manually. More specifically, the sucker and side separators are moved outward only when the manual operation unit designates lifting of the pile board. Alternatively, the sucker and side separators may be moved outward not when the manual operation unit designates lifting of the pile board, but when lifting of the pile board in response to the designation from the manual operation unit is detected.

[0210] According to the present invention, the suction wheel and side jiggers of the delivery unit are defined as the adjustment target portion. In the delivery unit, as the sheets that are dropped and stacked due to delivery increase, the pile board is lowered automatically. The pile board can be lowered manually and lifted manually. In this case, the suction wheel and side jiggers are moved outward in response to the lifting designation for the pile board from the manual operation unit, in the same manner as in the feed unit. Alternatively, the suction wheel and side jiggers may be moved outward not when the manual operation unit designates lifting of the pile board, but when lifting of the pile board in response to the designation from the manual operation unit is detected. In the delivery unit, the pile board is not automatically lifted during printing. Hence, the suction wheel and side jiggers may always be moved outward in accordance with lifting of the pile board regardless of whether the operation is manual/automatic.

[0211] According to the present invention, the position of the adjustment target portion is moved outward in response to lifting of the pile board. Once the pile board is lifted, in response to stop of the pile board, the adjustment target portion is returned to the initial position where it has been before the pile board is lifted. In this case, the adjustment target portion may fall within the sheet size of the sheets stacked on the pile board. The adjustment target portion, however, is returned to the initial position from the side of the sheets stacked on the pile board. Even if the adjustment target portion abuts against the sheets, the abutting force is absorbed as the sheets stacked on the pile board are shifted in the horizontal direction. Thus, the adjustment target portion will not be broken.

[0212] According to the present invention, when moving the position of the adjustment target portion outward in response to lifting of the pile board, the adjustment target portion may be moved outward from the current position (preset position) by a predetermined distance. Alternatively, the preset position determined in accordance with the sheet size of the sheets may be determined as the reference, and the adjustment target portion may be moved to a position outwardly spaced apart from the preset position by a predetermined distance. In this case, if the "predetermined distance" is minimized as much as possible, the moving distance of the adjustment target portion can be decreased, so that the time taken for returning the adjustment target portion to the initial position (preset value) can be shortened.

What is claimed is:

1. A position adjusting method for an adjustment target portion in a sheet processing machine comprising a pile board which is lifted and lowered with a sheet stacked thereon, and

the adjustment target portion a position of which is adjusted in accordance with a size of the sheet on the pile board, comprising the steps of:

lifting the pile board with the sheet stacked thereon; and moving the adjustment target portion in a direction to further separate from a center of the sheet on the pile board as the pile board is lifted.

2. A method according to claim 1, wherein the step of moving comprises the step of moving the adjustment target portion in the direction to further separate from the center of the sheet stacked on the pile board when lifting of the pile board is manually designated.

3. A method according to claim 1, wherein the step of moving comprises the steps of

detecting lifting of the pile board, and

moving the adjustment target portion in the direction to further separate from the center of the sheet on the pile board when lifting of the pile board is detected.

4. A method according to claim 1, further comprising the steps of:

detecting stop of lifting of the pile board, and

returning the adjustment target portion, when stop of lifting of the pile board is detected, to a position where the adjustment target portion has been before the pile board is lifted.

5. A method according to claim 1, wherein the step of moving comprises the step of moving the adjustment target portion by a predetermined distance in the direction to further separate from the center of the sheet on the pile board.

6. A method according to claim 1, further comprising the steps of

inputting the sheet size of the sheet on the pile board, and setting a preset position of the adjustment target portion in accordance with the input sheet size of the sheet,

wherein the step of moving comprises the step of moving the adjustment target portion from the preset position to a position spaced apart by a predetermined distance in the direction to further separate from the center of the sheet on the pile board.

7. A position adjusting apparatus comprising:

a pile board which is lifted and lowered with a sheet stacked thereon;

an adjustment target portion a position of which is adjusted in accordance with a size of the sheet on said pile board; and

moving means for moving said adjustment target portion in a direction to further separate from a center of the sheet on said pile board as said pile board is lifted.

8. An apparatus according to claim 7, further comprising a manual operation unit which designates lifting of said pile board,

wherein said moving means moves said adjustment target portion when said manual operation unit designates lifting of said pile board.

9. An apparatus according to claim 7, further comprising a detection unit which detects lifting of said pile board,

wherein said moving means moves said adjustment target portion when said detection unit detects lifting of said pile board.

10. An apparatus according to claim 7, further comprising means for returning said adjustment target portion, when lifting of said pile board is stopped, to a position where said adjustment target portion has been before said pile board is lifted.

11. An apparatus according to claim 7, wherein said moving means moves said adjustment target portion by a predetermined distance in the direction to further separate from the center of the sheet on said pile board when said pile board is lifted.

12. An apparatus according to claim 7, further comprising: an input unit which inputs the sheet size of the sheet stacked on said pile board; and means for determining a preset position of said adjustment target portion in accordance with the input sheet size of the sheet.

wherein said moving means moves said adjustment target portion from the preset position to a position spaced apart by a predetermined distance in the direction to further separate from the center of the sheet on said pile board.

13. An apparatus according to claim 7, wherein said adjustment target portion comprises a sucker of a feed unit which feeds the sheet on said pile board.

14. An apparatus according to claim 7, wherein said adjustment target portion comprises a side separator of a feed unit which feeds the sheet stacked on said pile board.

15. An apparatus according to claim 7, wherein said adjustment target portion comprises a suction wheel of a delivery unit which delivers the sheet onto said pile board.

16. An apparatus according to claim 7, wherein the adjustment target portion comprises a side jogger of a delivery unit which delivers the sheet onto said pile board.

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