(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 155 858 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.11.2001 Bulletin 2001/47

(51) Int Cl.[7]: **B41F 33/16**, B41F 33/00, B41F 27/12, B41F 13/54

(21) Application number: **01111906.2**

(22) Date of filing: **17.05.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **17.05.2000 JP 2000144892**

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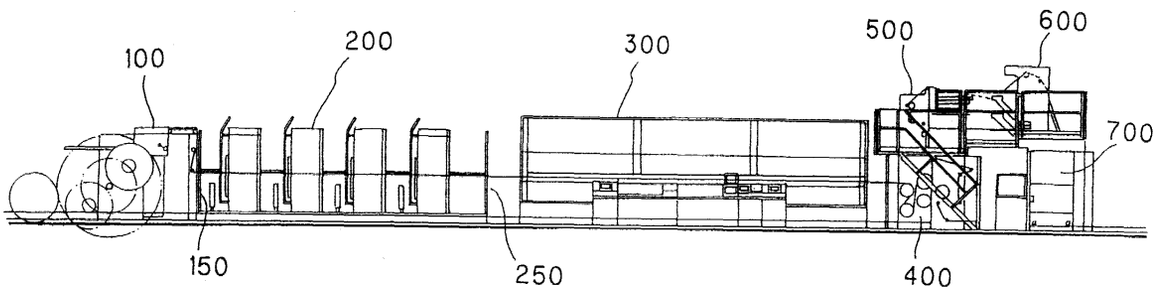
(54) Device for controlling automatic printing plate changing means and folding device status switching device

(57) A control device comprises printing plate changing means (207,208) for changing a printing plate supported on a plate cylinder (203,204), and means for switching a folding device status of a folding machine (700) in accordance with a folding device status in the next printing. The control device operates the printing plate changing means (203,204) and the means for switching the folding device status of the folding device simultaneously in order to shorten the total operation time.

FIG. 1



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Description

[0001] The entire disclosure of Japanese Patent Application No. 2000-144892 filed on May 17, 2000 and Japanese Patent Publication No. 2000-130538 published on May 12, 2000 including specification, claims, drawings and summary is incorporated herein by reference in its entirely.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The invention relates to a device for controlling an automatic printing plate changing device and a folding device status switching device, and particularly to a device with a cam mechanism and a guide mechanism wherein an automatic printing plate change (APC) and a folding device status switch are operated simultaneously.

[Prior Art]

[0003] In a conventional art, when changing from a previous job to a next job in a web offset printing press, changing of a printing press and switching of a folding status has to be executed in order. Therefore, the entire task takes a long time.

[0004] For example, when the previous job is finished, printing units are stopped to clean a blanket cylinder with a blanket. Then, printing plates are exchanged, and further, an old web roll is changed to a new web roll. In order to prepare for the next job, various presetting operations such as an adjustment of an open degree of an ink fountain key in accordance with a picture pattern of a new printing press, a control of a rotational amount of each ink fountain roll, a determination of an amount of supplying dampening water, and a setting of a folding machine.

[0005] In the above described conventional art, when changing from the previous job to the next job, an operator has to operate to activate each device in order. Thus, it takes a long time and a heavy burden is imposed on the operator.

[0006] The purpose of the present invention is to resolve the above problems by simultaneously operating the changing of the printing plates and the switching of the folding device status in the folding device.

SUMMARY OF THE INVENTION

[0007] To accomplish the above object, a device according to the present invention for controlling an automatic printing plate changing device and a folding device status switching device comprises printing plate changing means for changing a printing plate supported on a plate cylinder, and folding device status switch means for switching folding device status of a folding machine in accordance with the folding device status in the next printing job, wherein the printing plate changing means and the folding device status switching means are operated simultaneously.

[0008] To accomplish the above object, the device according to the present invention for controlling an automatic printing plate changing device and a folding device status switching device, further includes means for intermitting travel of a web in the folding device while the printing plate supported on the plate cylinder is being changed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Based on a first signal from the switch, the ink supplement means reduces the ink amount the basic ink layer thickness distribution, and the web continuous supplement means replaces and connects the web rolls. Based on a second from the switch, the printing plate changing means and the folding device status switching means are activated, and based on a third signal from the switch, the ink supplement means is activated to overlap the ink layer thickness distribution in accordance with the next printing.

Fig. 1 is the entire schematic view of an offset rotary printing press of an embodiment according to the present invention;
Fig. 2 shows a sheet supply device;
Fig. 3 is a cross sectional view of a printing unit;
Fig. 4 shows an ink supply device;
Fig. 5 is a flow-chart for showing a plurality of steps executed by pushing on the switch for APC and the selection of the folding device status;
Fig. 6 shows a cam switching operation in a cam mechanism of the present invention; and
Fig. 7 shows a guide switching operation in a guide mechanism of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] A preferred embodiment of a web offset printing press according to the present invention is shown in Fig. 1.

[0011] The web offset printing press as shown in Fig. 1, continuously activates each device so that the previous job can be automatically switched to the next job. The web offset printing press comprises a sheet supply device 100, a plurality of printing units 200, a drying device 300, a cooling device, a web passing device 500, a drag device 600, a folding device 700, and so on.

[0012] In the sheet supply device as shown in Fig. 2, two web rolls 101 and 102, each wound in a roll form, are attached to the both ends of a turret arm 104, respectively, and the turret arm 104 is pivotally mounted such that the arm 104 is rotatable about a central axis 103. When a web 10 (printing sheet) is rolled out from

a web roll 101 and becomes close to an end, a web from the next web roll 102 is jointed and supplied to the printing units 200.

[0013] In each printing unit 200 as shown in Fig. 3, blanket cylinders 201, 202 and printing cylinders 203, 204 are arranged symmetrically with respect to a horizontal web traveling path. A blanket cleaning device 205 (206) is provided at each blanket cylinder 201 (202) and an automatic printing plate changer (APC) 202 (208) is provided at the printing cylinder 203 (204).

[0014] The upper automatic printing plate changer 207 provides a guide frame 211 rotatable about a supporting axis 209, and an actuation 213 shifts the guide frame 211 from a stand by position to a printing plate changing position as shown in a dotted line. At the guide frame 211, a holder 215 for holding an old printing plate or a new printing plate is provided.

[0015] After shifting the guide frame 211 to the printing plate changing position, the old printing plate is released from the printing cylinder 203. By backwardly rotating the printing plate 203, the old printing plate is guided along the guide frame 211 so that the old printing plate can be picked up by extending/shrinking an actuator (not shown).

Then, the new printing plate is supplied to a printing cylinder 203 along the guide frame 211. By forwardly rotating the printing plate 203, the new printing plate is attached to the printing cylinder 203.

[0016] Similarly, a lower automatic printing plate changing device 208 provides a guide frame 212 rotatable about a supporting axis 210, and an actuator 214 shifts the guide frame 212 from a stand by position to a printing plate changing position along a dotted line as shown in the drawing. A holder 216 for holding the old printing plate or the new printing plate is provided at the guide frame 212.

[0017] After shifting the guide frame 212 to the printing plate changing position, the old printing plate is disengaged from the printing cylinder 204. By backwardly rotating the printing cylinder 204, the old printing plate is lowered along the guide frame 211.

[0018] Then, the new printing plate is supplied to the printing cylinder 204 along the guide frame 212. By forwardly rotating the printing cylinder 204, the new printing plate is attached to the printing cylinder 204.

Regarding the printing plate mounted on the printing cylinder 203 (204), an ink supplement device 800 is provided as shown in Fig. 4.

[0019] The ink supply device 800 supplies ink 802 in an ink fountain 801 on an ink fountain roller 803 by adjusting an open degree of each ink fountains keys 804-1, 801-2, ... 801-n. Ink supplied on the ink fountain roller 803 is transferred to a printing plate 807 through a group 806 of ink rollers by operating an ink ductor roller 805. Simultaneously with such an ink supply operation, dampening water 808 is supplied to the printing plate 807 through a group of dampening rollers 809.

[0020] In the ink supply device 800, when changing the old printing plate 807 to a new printing plate, printing data such as an open degree of the each ink fountain keys 804-1, 804-2, ... 804-n corresponding to a picture pattern of the new printing plate, a rotational amount of the ink fountain roller 803, and a supply amount of dampening water in the dampening water tank 808 is preset as described below.

[0021] The blanket cleaning device 205 (206) removes foreign matter such as remained ink and so on by contacting a brush or cloth with the blanket cylinder 201 (202).

[0022] A drying machine 300 is a device for heating and drying a printed web 10 fed through the printing units 200. A cooling device 400 is a device for cooling the web 10 passed through the drying machine 300. A web path device 500 is a device for adjusting a passing direction to control a position of a web and its tensile force. A folding device 700 is a device for cutting the web after dry and cool operations and folds each piece of the web 10.

[0023] There are a number of types of folding devices based on combinations of cutting and folding the web, such as folding along a central line of the web with respect to a width direction, it is so-called as "former fold", cutting a web having a predetermined length by a cut-off cylinder, folding a cut-off sheet by a folding cylinder along a width direction or a longitudinal direction, it is so called as "parallel fold", and half folding parallel folded sheets by a chopper along an orthogonal direction.

[0024] An infeed dancer device 150 is provided between the sheet supply device 100 and the printing units 200, and a final unit dancer device 250 is provided between the printing units 200 and the drying machine 300.

[0025] The dancer device 150(250) winds a web among three rollers, and by moving a central roller in a vertical direction, removes slackness in the web caused by rotation of the printing units 200 in forward/backward directions.

[0026] These devices 200 through 700 are connected by on driving axis and driven by a main motor (not shown) mounted at the printing units 200. The main motor can be disconnected from the driving axis by operating a driving clutch provided between the printing units 200 and the final unit dancer 250.

[0027] The offset rotary printing press, constructed as described above, is provided with a control device for simultaneously conducting the printing plate change and the folding device status change in accordance with a flow-chart as shown in Fig. 5 by an operator's turning on of a start button for changing a printing plate and a folding device status upon changing a printing job.

[0028] Namely, when the switch for changing a printing plate and a folding device status is turned on, the rotary printing press is activated (step V1) and the driving clutch is turned off when the folding cylinder of the folding machine 700 has moved to a specific position (step V2).

[0029] The reason for turning of the driving clutch is

to avoid occurrence troubles in the folding machine 700, such as the folded sheet falling from the gripping cylinder and the folding cylinder, caused by the reverse rotation in the folding machine 700 for cutting and folding the folded sheet.

[0030] Next, the final unit dancer 250 is turned on (step V3) so that a web fed from the printing units 200 to the drying device 300 is prevented from becoming loose by winding the web around a roller moving in a up-down directions.

[0031] Then, when the plate cylinder 203 (204) is moved to a specific position for exchanging the printing plate, the device (the printing units 200 only) is stopped (step V4).

[0032] The plate cylinders 203 (204) is rotated in the reverse direction, the old printing plate is removed from the plate cylinder 203 (204) by the automatic printing plate exchanger 207 (208) (step V5).

[0033] By rotating the plate cylinder 203 (204) in a reverse direction, a roller of the finial unit dancer 250 is returned to the original position (step V6). At the same time, the infeed dancer device 150 is turned on (step V7) in order to avoid the web fed from the printing units 200 to the sheet supply device 100 from loosening.

[0034] Thereafter, after finishing removal of the old printing plate, the machine (the printing units 200 only) is stopped (step V8).

[0035] Then, the machine (the printing units 200 only) is rotated in the forward direction, the new printing plate is supplied from the automatic printing plate exchanger 207 (208) and attached to the plate cylinder 203 (203) (step V9).

[0036] Further, the final unit dancer 250 is turned on (step V10) to prevent the web fed from the printing units 200 to the drying machine 300 from becoming loose. Simultaneously, the roller of the infeed dancer device 150 is returned to the original position (step V11).

[0037] When setting of the new printing plate on the plate cylinder 203 (204) has completed, the machine (the printing units 200 only) is stopped (step V12).

[0038] After turning off the driving clutch, a brake of the folding machine is turned on (step V13) to change folding device status simultaneously.

[0039] The folding device status is changed by adjusting a phase of the folding cylinder and the gripping cylinder (step V14) and a selection of a cam/guide member (step V15).

[0040] An adjustment of the phase of the folding cylinder and the gripping cylinder means to change the phase of a gripping board of the gripping cylinder with respect to a needle and a knife of the folding cylinder corresponding to a single parallel fold or a double parallel fold. For example, as shown in Japanese Patent Publication Kokai 63-282053, the adjustment is made by a gear transmission mechanism.

[0041] Switching of the cam/guide member includes cam switching for changing a phase of a cam mechanism for switching an operation timing of a gripping claw, knife, needle and so on provided at a cutting cylinder, a folding cylinder and a gripping cylinder and a guide switching mechanism for changing the single parallel fold, the double parallel fold, and a delta fold.

[0042] As shown in Fig. 6, a cam switching mechanism comprises a cam holder 3 rotatably supported and having, on an outer peripheral portion thereof, protrusions 3a, 3b, a circular cam 4 attached to the cam holder 3 and having a predetermined outer peripheral shape, a cam follower 15 that rolls on the outer peripheral surface of the cam 4, a link plate 8 connected to the protrusion 3b of the cam holder 3 and extends and retreats to rotate the cam holder 3, a lever 10, an air cylinder 13, a first stopper 6 for restricting rotation of the cam 4 in one rotating direction caused by the extension the air cylinder 13, a second stopper 14 for restricting rotation of the cam 4 in the opposite rotating direction caused by retraction the air cylinder 13, and a third stopper 5 for urging the protrusion 3a of the cam holder 3, restricted from rotating in the opposite direction by the second stopper 14, in the rotating direction restricted by the second stopper 14. The detailed description of the above structure is described in Japanese Patent Publication No. 2000-130538 published on May 12, 2000 based on Japanese Patent Application Hei10-301983 filed on October 23, 1988.

[0043] As the guide switching member, there is a structure as shown in Fig. 7.

[0044] The device, as shown in Fig. 7, is a parallel folding device having a first gripping cylinder 23 and a second gripping cylinder 24, the peripheral surfaces of which are in contact with each other. A belt 21 is wound on the first gripping cylinder 23 and rollers 20a through 20d arranged parallel to the first gripping cylinder 23. The detailed description of the above structure is described in PCT application (PCT/JP00/01597 filed on March 16, 2000) based on Japanese Patent Application No. 10-266166 filed on September 21, 1998.

[0045] In the case where a single parallel fold is operated in the device, the roller 20d is moved along a solid line in Fig. 7 and the belt 21 is moved to a guiding position.

[0046] At the guiding position of the belt 21, a sheet is changed from the first gripping cylinder 23 to the second gripping cylinder 24 to parallel-fold the sheet once.

[0047] If the double parallel fold or the delta fold is operated, the roller 20d is moved toward an arrow along a dotted line in Fig. 7 and the belt 21 is shifted to a shelter position.

[0048] At the shelter position of the belt 21, the double parallel fold or the delta fold is operated when the sheet is passed from the first gripping cylinder 23 to the second gripping cylinder 24.

[0049] Upon finishing the above exchange of the printing plates and the selection of folding device status, the driving clutch is turned on (step V16), and the dancer device 150, 250 is returned to the original position (step V17).

[0050] Thus, the automatic printing plate change and the switch of the folding device status are accomplished.

[0051] As described above, in the embodiment according to the present invention, when the previous job is switched to the next job, each devices 100 through 800 are automatically operated by an operator's pushing of one button so that the total operation time can be shortened and the operator's task/burden becomes lighter.

[0052] That is, by actuating a start button for changing a printing plate and a folding device status, an automatic printing plate changing and a folding device status switching can be operated. In addition, the automatic printing plate changing and the folding device status switching are operated in parallel so that the total operation time can be shortened.

[0053] In the case that the web 10 is rotated in forward/backward directions during an operation for changing the automatic printing plates, the dancer devices 150, 250 wind up the web 10 among three rollers to prevent the web 10 from becoming loose at a portion between the sheet supplement device 100, the printing units 200, and the drying machine 300.

[0054] As described above with reference to the embodiment of the present invention, in the device according to the present invention for controlling an automatic printing plate changing and a folding device status switching, the previous job is automatically changed to the new job by pushing one button. The automatic printing plate changing and the folding device status switching are simultaneously operated so that the total operation time can be shortened.

[0055] In the operation for changing printing plates, even if the web is rotated in forward/backward directions, the web can be wound such that the web does not become loose at a portion between adjacent devices.

[0056] The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art arc intended to be included within the scope of the following claims.

Claims

1. A control device for controlling an automatic printing plate changing means (207, 208) and a folding device status switching means, comprising:

   printing plate changing means (207, 208) for changing a printing plate supported on a plate cylinder (203, 204); and
   folding device status switching means for switching folding device status of a folding machine (700) in accordance with a folding device status corresponding to the next printing job,
   wherein said control device activates said printing plate changing means (207, 208) and said folding device status switching means simultaneously.

2. A control device as claimed in claim 1, wherein said printing plate changing means (207, 208) intermits printing units when said plate cylinder (203, 204) is moved at a specific position for changing said printing plate, and rotates said plate cylinder in a reverse direction to pick up an old printing plate (101) from said plate cylinder and rotates said plate cylinder in a forward direction to set said new printing plate (102) to said plate cylinder.

3. A control device as claimed in claim 1, wherein said folding device status switching means changes a phase of a gripping board of a gripping cylinder with respect to a needle and a knife of a folding cylinder in accordance with a single parallel fold and a double parallel fold.

4. A control device as claimed in claim 1, wherein said folding device status switching means includes,

   a cam switch member for switching a phase of a cam mechanism for switching an operation timing of a cutting cylinder, a folding cylinder, and a gripping cylinder with operation tools such as a needle member and a knife member, and
   a guide switch member for switching a guide mechanism for selecting one of said single parallel fold, said double parallel fold, and said delta folding.

5. A control device for controlling an automatic printing plate changing means and a folding device status switching means as claimed in claim 1, wherein said control device includes means for intermitting a travel of a web in said folding machine while said plate cylinder is rotated in forward and reverse directions to change from an old printing plate supported on said plate cylinder to a new printing plate.

6. A cam switching mechanism, comprising:

   a cam holder having protrusions supported on an outer peripheral portion of said cam holder;
   a circular cam having a predetermined outer peripheral shape attached to said cam holder;
   a cam follower rolled on said outer peripheral surface of said circular cam;
   a link plate connected to said protrusion of the cam holder;
   a first stopper for restricting rotation of said circular cam in one direction caused by extending an air cylinder;

a second stopper for restricting rotation of said circular cam in an opposite direction by contracting said air cylinder; and

a third stopper for urging said protrusion of said circular cam holder restricted by the second stopper.

FIG. 1

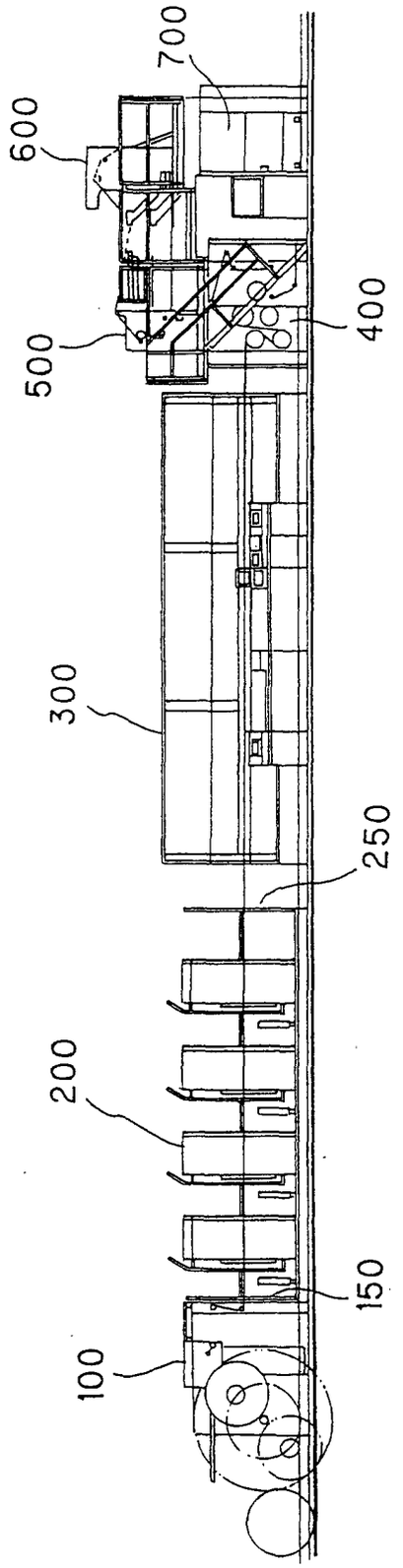

FIG. 2

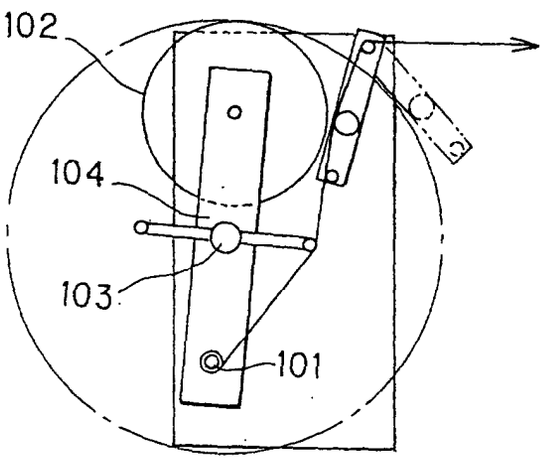

FIG. 3

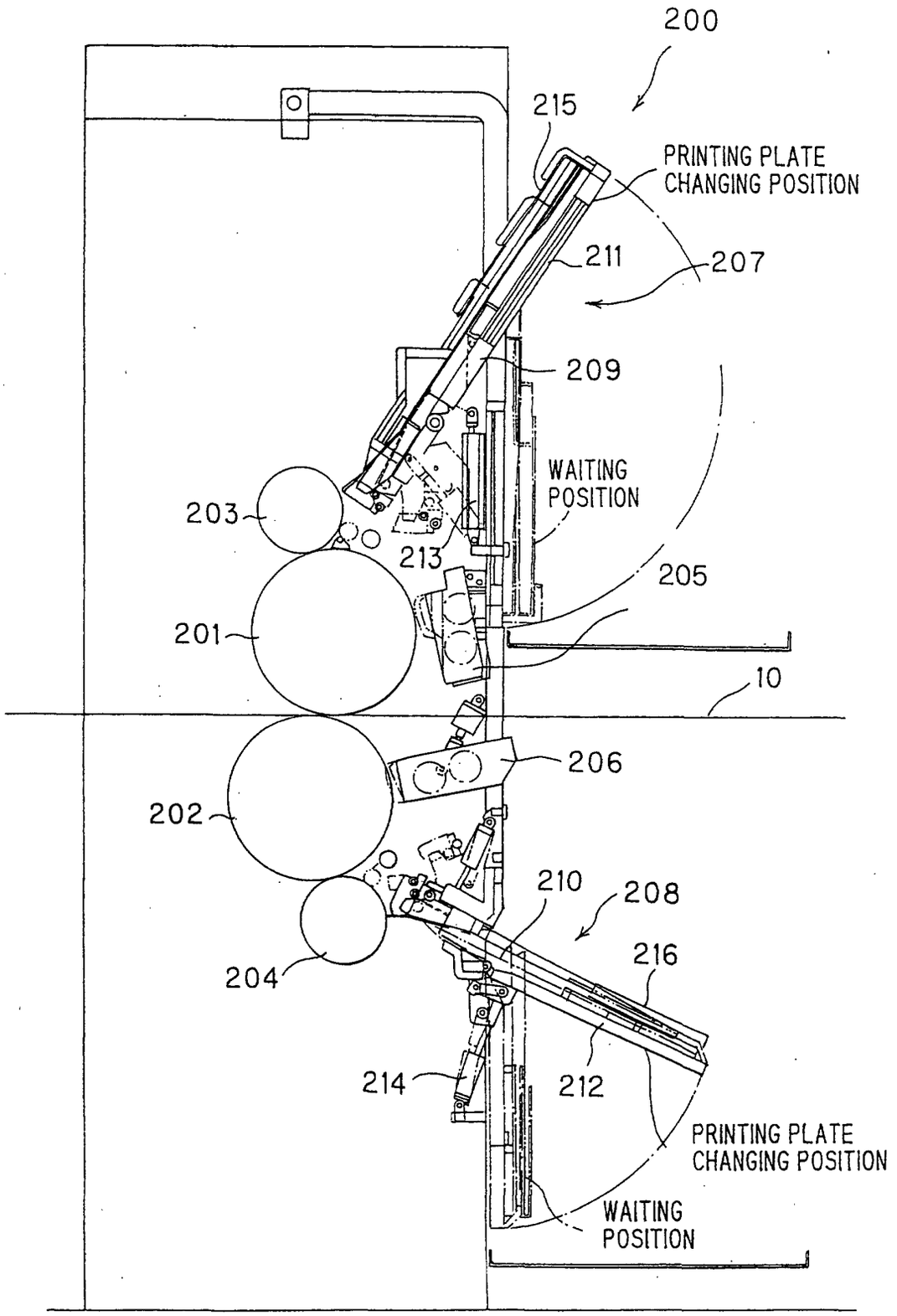
200
215
PRINTING PLATE CHANGING POSITION
211
207
209
WAITING POSITION
203
213
205
201
10
206
202
210
208
216
204
214
212
PRINTING PLATE CHANGING POSITION
WAITING POSITION

FIG. 4

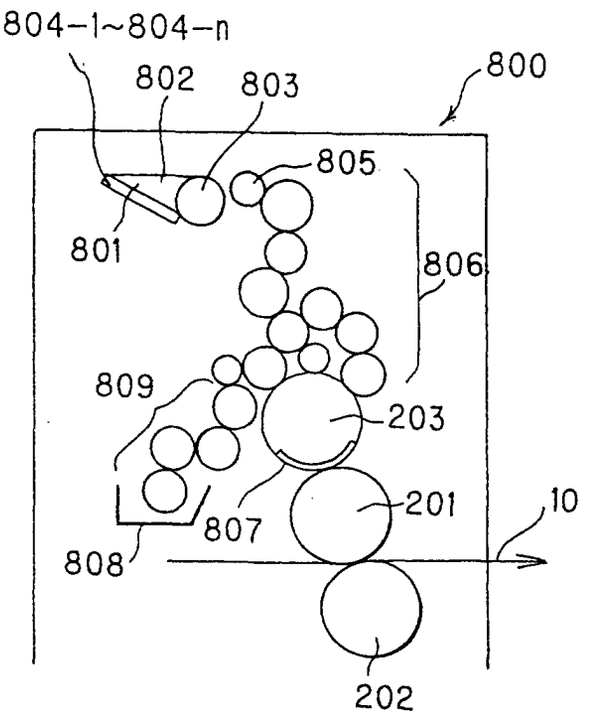

FIG.5

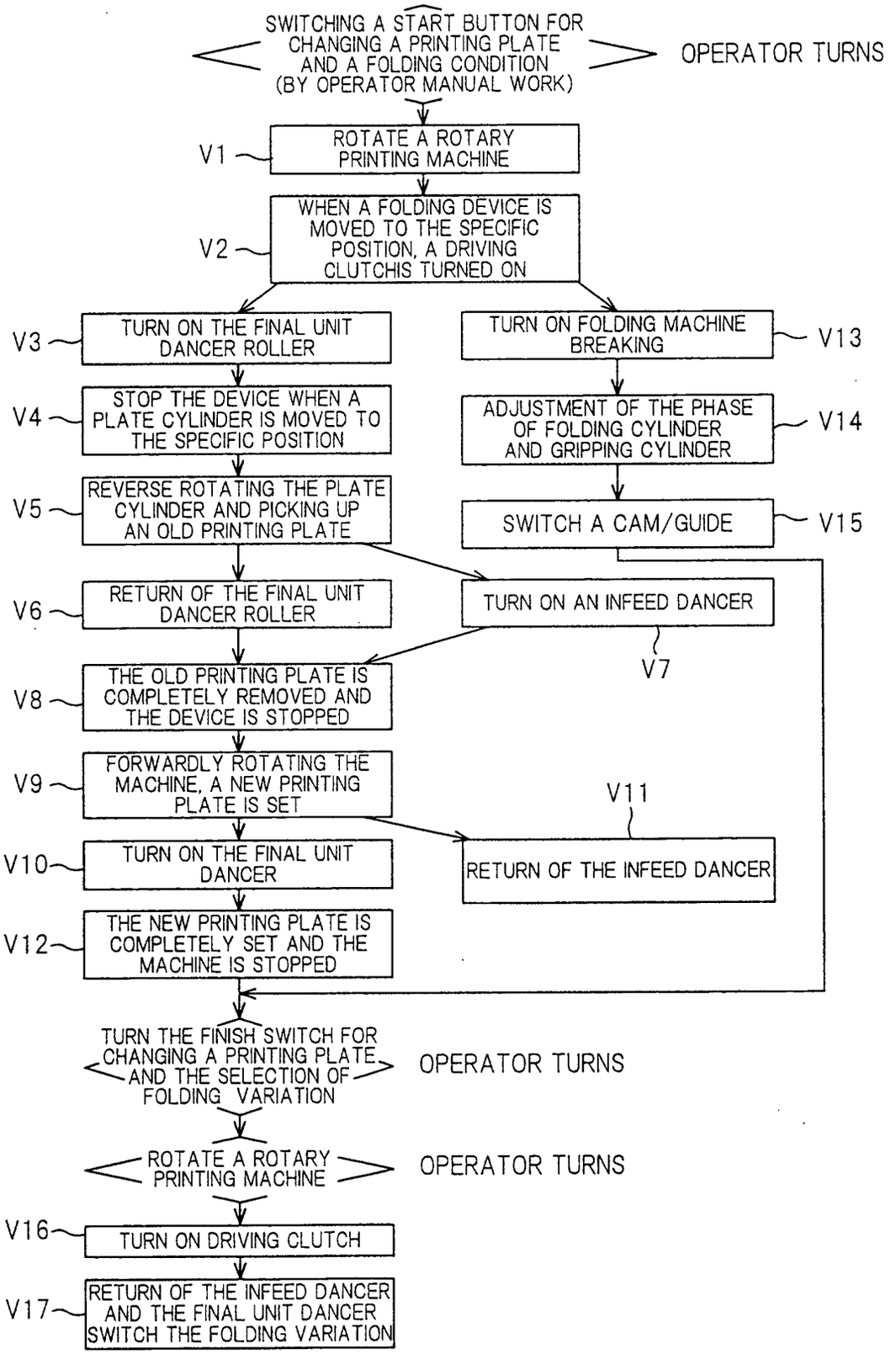
SWITCHING A START BUTTON FOR CHANGING A PRINTING PLATE AND A FOLDING CONDITION (BY OPERATOR MANUAL WORK)
OPERATOR TURNS
V1
ROTATE A ROTARY PRINTING MACHINE
V2
WHEN A FOLDING DEVICE IS MOVED TO THE SPECIFIC POSITION, A DRIVING CLUTCHIS TURNED ON
V3
TURN ON THE FINAL UNIT DANCER ROLLER
V4
STOP THE DEVICE WHEN A PLATE CYLINDER IS MOVED TO THE SPECIFIC POSITION
V5
REVERSE ROTATING THE PLATE CYLINDER AND PICKING UP AN OLD PRINTING PLATE
V6
RETURN OF THE FINAL UNIT DANCER ROLLER
V8
THE OLD PRINTING PLATE IS COMPLETELY REMOVED AND THE DEVICE IS STOPPED
V9
FORWARDLY ROTATING THE MACHINE, A NEW PRINTING PLATE IS SET
V10
TURN ON THE FINAL UNIT DANCER
V12
THE NEW PRINTING PLATE IS COMPLETELY SET AND THE MACHINE IS STOPPED
V13
TURN ON FOLDING MACHINE BREAKING
V14
ADJUSTMENT OF THE PHASE OF FOLDING CYLINDER AND GRIPPING CYLINDER
V15
SWITCH A CAM/GUIDE
V7
TURN ON AN INFEED DANCER
V11
RETURN OF THE INFEED DANCER
TURN THE FINISH SWITCH FOR CHANGING A PRINTING PLATE AND THE SELECTION OF FOLDING VARIATION
OPERATOR TURNS
ROTATE A ROTARY PRINTING MACHINE
OPERATOR TURNS
V16
TURN ON DRIVING CLUTCH
V17
RETURN OF THE INFEED DANCER AND THE FINAL UNIT DANCER SWITCH THE FOLDING VARIATION

FIG. 6

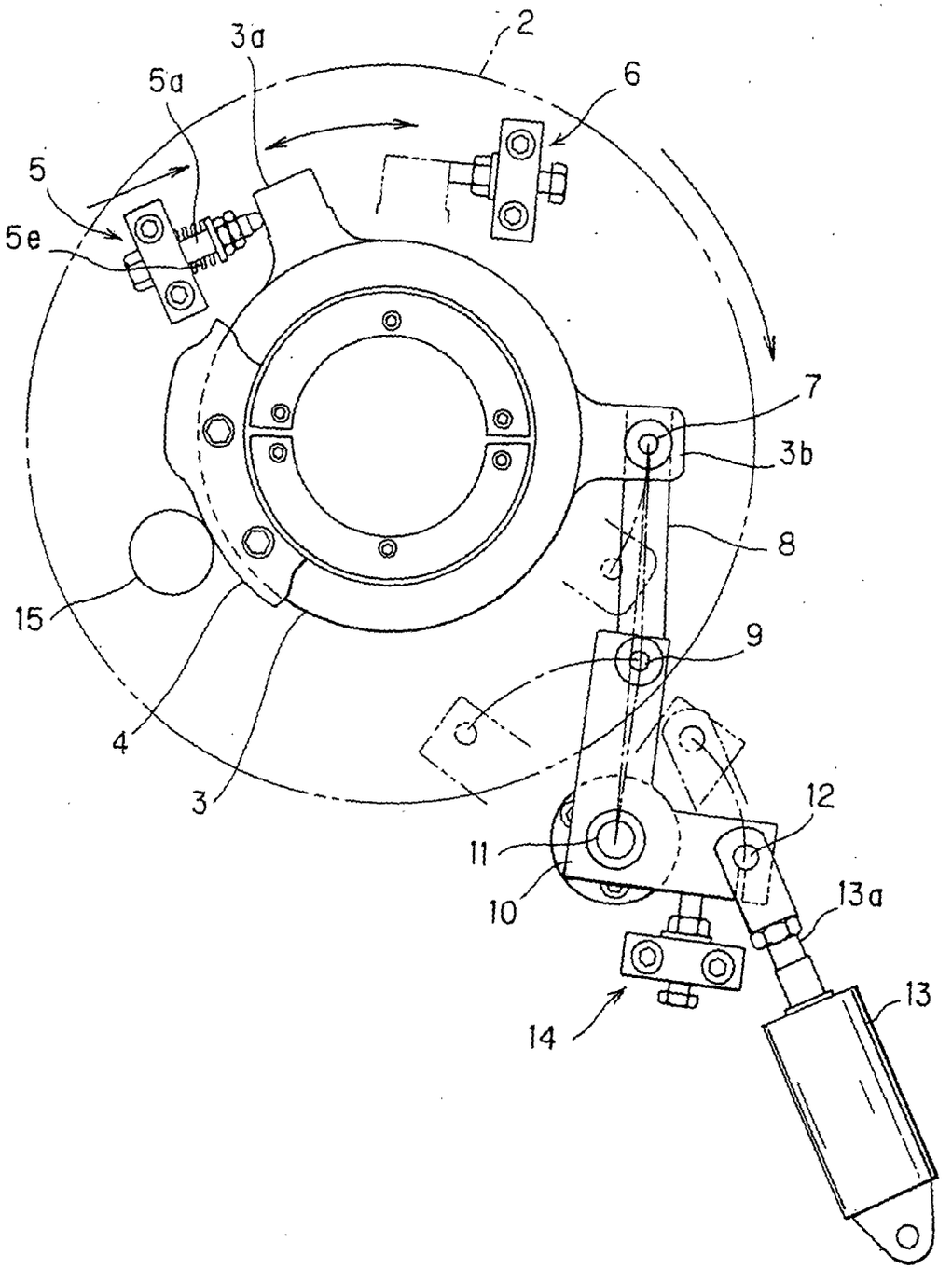

FIG. 7