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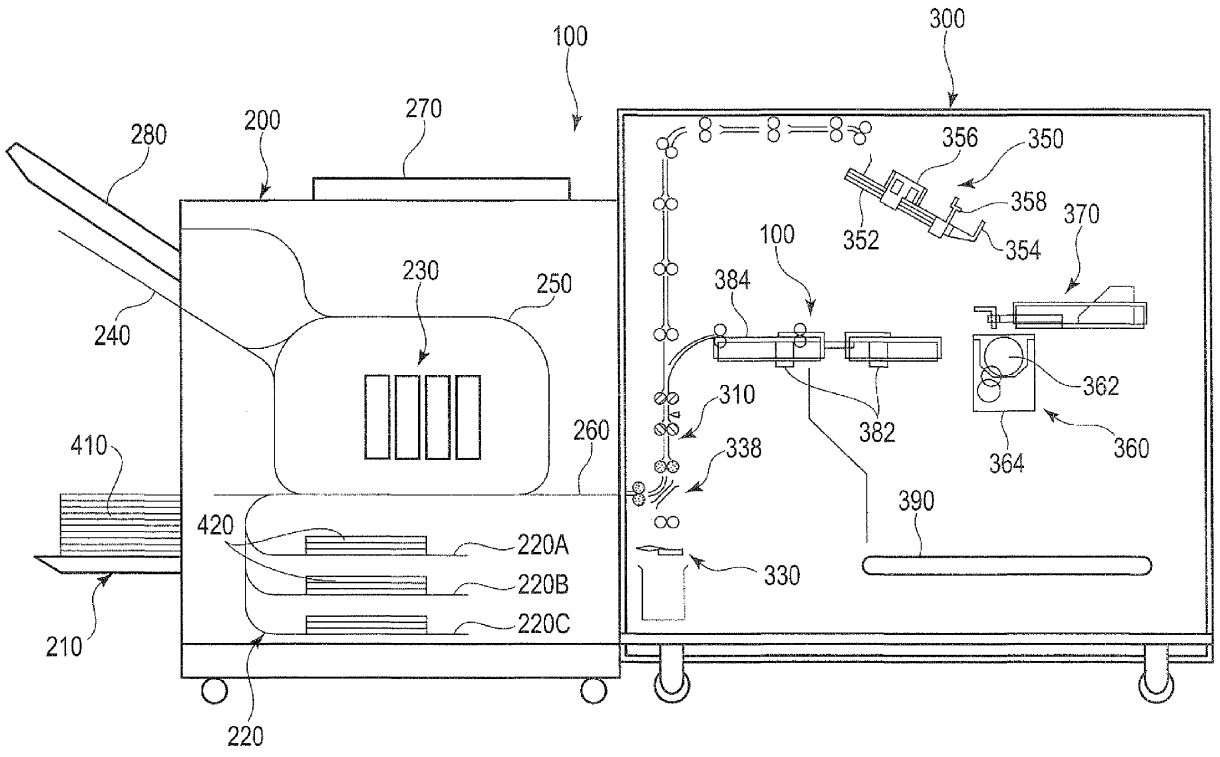
(54) Image-forming system

(57) An image-forming system includes an image-forming unit for forming an image on a sheet, a sheet feeding unit including at least a pair of feed rollers for feeding the sheet on which the image has been formed, a cutting unit for cutting away a waste portion of the sheet, and a controller. The controller is operable to controlling the sheet feeding unit for a cleaning operation of the pair of feed rollers, before the waste portion is cut away, so as to hold the sheet and drive the pair of feed rollers in contact with the waste portion of the sheet. According to the image-forming system, the pair of feed rollers can be easily cleaned up by effectively utilizing the waste portion.

FIG.1



EP 2 506 080 A2

Description

[0001] The present invention relates to an image-forming system including a binding machine for stacking printed sheets fed out from an image-forming machine and binding the stacked sheets.

Description of Prior Art

[0002] Recently, various image-forming systems each has a booklet binding function are developed and well known. According to the booklet binding function, printed sheets (papers) fed out from an image-forming machine are stacked and concurrently edges of the sheets are evened up. Then, a spine of the sheets is glued, and thereby binding of a booklet is finished.

[0003] In a Japanese Patent Application Laid-Open No. 2004-209869, disclosed is a binding apparatus in which sheets ejected from an image-forming machine are received from its ejection port to introduce them onto a sheet feed path and stack them in a sheet stack on a tray provided downstream along the sheet feed path while edges of them are evened up. The sheet stack on the tray is transferred to a gluing unit after orientated vertically and then a spine of the sheet stack is glued. The glued sheet stack is attached with a cover sheet supplied from an inserter provided along the sheet feed path, and the cover sheet is folded to cover the sheet stack.

[0004] In image-forming apparatuses, also well known is an apparatus including a cleaning mechanism that cleans feed rollers for feeding sheets on which an image (s) is printed (formed).

[0005] In a Japanese Patent Application Laid-Open No. 2009-51618, disclosed is an image-forming apparatus in which feed rollers for feeding at least one-sided printed sheet and an cleaning element provided near the feed rollers is pressed onto the feed rollers. In order to clean the feed rollers up, the cleaning element is pressed onto the rotated feed rollers timely when contamination of the feed roller is detected and printing is not performed.

Statement of Invention

[0006] Also in an image-forming system with booklet binding function, contamination of feed rollers for feeding double-sided printed sheets is desired to be solved. If the cleaning element is applied to this image-forming system in order to clean the feed rollers up, cleaning problems may be solved. However, its mechanism and configuration of the system may become complicated and maintenances of the cleaning element may be needed, so that user's convenience is notably degraded.

[0007] An object of the present invention is to provide an image-forming system that can easily clean its feed rollers with simple configuration.

[0008] An aspect of the present invention provides an image-forming system that includes an image-forming unit for forming an image on a sheet, a sheet feeding unit including at least a pair of feed rollers for feeding the sheet on which the image has been formed, a cutting unit for cutting away a waste portion of the sheet, and a controller. The controller is operable to controlling the sheet feeding unit for a cleaning operation of the pair of feed rollers, before the waste portion is cut away, so as to hold the sheet and drive the pair of feed rollers in contact with the waste portion of the sheet.

[0009] According to the aspect, the cleaning operation of the pair of feed rollers is done with the waste portion. Therefore, the pair of feed rollers can be easily cleaned up by effectively utilizing the waste portion to be cut away.

[0010] It is preferable that the sheet feeding unit includes the pair of feed rollers to be cleaned up and a pair of reference rollers that holds the sheet by nipping with a nipping pressure greater than a feeding force by the pair of feed roller to be cleaned up, and the controller, by controlling the sheet feeding unit in the cleaning operation, feeds the sheet to a cutting position where the waste portion to be cut away is nipped by the pair of reference rollers, stops rotation of the pair of reference rollers to hold the sheet with the nipping pressure, and spins the pair of feed rollers in each rotational direction so as to feed the sheet away from the pair of reference rollers.

[0011] According to this configuration, the sheet is held by the pair of reference rollers and, concurrently, the pair of feed roller to be cleaned up is spun so as to feed the sheet away from the pair of reference rollers (the sheet is not fed because it is held by the pair of reference rollers with the above-explained nipping pressure). Therefore, contamination on the feed roller can be wiped away by a simple configuration without adding an extra configuration or device such as an extra cleaning roller(s) only used for the cleaning operation.

[0012] It is preferable that the pair of feed rollers to be cleaned up is located most upstream along a feed path of the sheet in the sheet feeding unit.

[0013] Here, the pair of feed rollers to be cleaned up is located most upstream along the feed path of the sheet. In other words, the pair of feed rollers locates nearest to the image-forming unit, so that pair of feed rollers tends to be contaminated most. Therefore, according to this configuration, the pair of feed rollers that tends to be contaminated most can be cleaned up surely.

[0014] It is preferable that the sheet is classified to a cover sheet or a text-block sheet, the system further comprises a text body stacker that receives the text-block sheet sequentially fed from the sheet feeding unit and evens up edges thereof to form a sheet stack, and a binding unit that binds the sheet stack with the cover sheet of which the waste portion has been cut away by the cutting unit to make a booklet. Here, the controller, by controlling the sheet feeding unit, calculates a length of the waste portion based on a length of the cover sheet, a length of the text-block sheet and a thickness of the sheet stack, and feeds the cover sheet to the cutting position based on the calculated length of the waste portion.

[0015] According to this configuration, the cleaning operation is done base on the calculated length of the waste portion to be cut away. Therefore, the image-forming system can bind the booklet(s) having a superior appearance without degradation of user's convenience due to the cleaning operation.

Description of Drawings

[0016]

Fig. 1 is a schematic cross-sectional view of an image-forming system according to an embodiment;
Fig. 2 is a schematic side view showing a sheet feeding unit and a cutting unit in the image-forming system;
Fig. 3 is a block diagram showing configuration of the image-forming system;
Fig. 4 is a flow chart showing processes executed by the image-forming system;
Fig. 5A to 5F are schematic cross-sectional views showing operations of a binding machine in the image-forming system;
Fig. 6A is a flow chart of a cutting length calculation process done by the binding machine;
Fig. 6B is a flow chart of a cleaning process done by the binding machine;
Fig. 6C is a flow chart of a cover sheet cutting process done by the binding machine; and
Fig. 7A to 7H are schematic cross-sectional views showing a cleaning operation done in the binding machine.

Description of Specific Embodiment

[0017] Hereinafter, an embodiment of an image-forming system 100 having a binding machine will be explained with reference to the drawings.

[0018] As shown in Fig. 1, the image-forming system 100 is a system for printing a cover sheet 410 and text-block sheets 420 and then binding the printed cover sheet (s) 410 and the printed text-block sheets 420 to make a booklet (a book, a bound article) 440. The image-forming system 100 is configured by a combination of an image-forming machine 200 and a binding machine 300. The image-forming machine 200 forms images on (prints) a cover sheet 410 and text-block sheets 420. The binding machine 300 is provided adjacent to the image-forming machine 200 and downstream along a feed path of the sheets, and binds the printed cover sheet 410 and the text-block sheets 420 to make a booklet 440.

[0019] As shown in Fig. 1, the image-forming machine 200 is provided with an inkjet-type image-forming unit 230. The image-forming unit 230 prints on the cover sheet 410 and the text-block sheets 420 based on cover sheet image data and text-block image data. In addition, the image-forming unit 230 has line-type ink-heads that inject black (K), cyan (C), magenta (M) and yellow (Y) inks, respectively.

[0020] A first sheet supply unit 210 and a second sheet supply unit 220 are provided upstream of the image-forming unit 230 along the sheet feed path of the sheets. The cover sheets 410 to be printed are stored in the first sheet supply unit 210, and the text body sheets 420 to be printed are stored in the second sheet supply unit 220. The second sheet supply unit 220 is provided with a first sheet supply tray 220A, a second sheet supply tray 220B and a third sheet supply tray 220C in order to store various types and sizes of the text body sheets 420. The sheet are sequentially fed out, sheet by sheet, from the first sheet supply unit 210 and the second sheet supply unit 220 by sheet supply rollers (not shown) at a predetermined time toward the image-forming unit 230. Not that it is not necessary to store the cover sheets 410 in the first sheet supply unit 210 and the text-block sheets 420 in the second sheet supply unit 220. The sheets may be stored in any of the first sheet supply unit 210 and the second sheet supply unit 220.

[0021] A circular feed pathway 250 is provided around the image-forming unit 230. The printed sheets are fed out, through the circular feed pathway 250, to a sheet ejection unit 280 provided continuously from the circular feed pathway 250. Note that the printed sheets fed out to the sheet ejection unit 280 are not to be bound to make a booklet 440. In addition, a change-over flapper (not shown) is provided on the circular feed pathway 250 to change over the feed path to a pathway connected with the sheet ejection unit 280 or another pathway connected to a turn over unit 240 provided continuously from the circular feed pathway 250. A sheet fed to the turn over unit 240 is turned over upside down and fed to the image-forming unit 230 again by being switched back. In this manner, double-sided printing can be done on the cover sheets 410 or the text body sheets 420.

[0022] The cover sheet 410 or the text-block sheet 420 that was single-sided or double-sided printed is fed to the after-mentioned binding machine 300 through a feed through pathway 260 provided downstream of the image-forming unit 230 along the sheet feed path of the sheets. Flappers for changing over the feed path are provided on the circular feed pathway 250 and the feed through pathway 260 to feed the sheets appropriately.

[0023] An input panel 270 is provided above the image-forming unit 230. A touchscreen is provided on the input panel 270. A start button for starting an execution of the binding process, a cleaning mode selection button for selecting ON or OFF of a cleaning operation, a size selection button for selecting a sheet (paper) size and other various buttons for settings are displayed on the touchscreen. In a case where a booklet is to bound by used of image data acquired through a scanner or the like, various settings can be set through the input panel 27. However, user's settings may be set based on operational commands included in job data received from a computer connected with the system via a communication interface.

[0024] The binding machine 300 in the image-forming system 100 includes a sheet feeding unit 310 for feeding the printed cover sheets 410 and the text body sheets 420 fed from the feed through pathway 260 of the image-forming machine 200. A cutting unit 330 is provided adjacent to the sheet feeding unit 310. The cover sheet 410 is fed to the cutting unit 330 through a feed path change-over mechanism 338 and then cut into a desired size by the cutting unit 330. The printed cover sheets 410 are fed to a binding unit 380 through the sheet feeding unit 310, and the printed text body sheets 420 are fed to a text body sheet stacker 350 through the sheet feeding unit 310. Note that a change-over device (not shown) is provided on the sheet feeding unit 310 to change over the feed path to a pathway connected with the binding unit 380 or another pathway connected to a text body sheet stacker 350.

[0025] The text body sheet stacker 350 includes a stacking tray 352 on which the text body sheets 420 are sequentially stacked. An alignment end fence 354 and alignment side fences 356 are provided on the stacking tray 352. The alignment end fence 354 evens up front edges of the text body sheets 420 that are sequentially fed from the sheet feeding unit 310. The alignment side fences 358 even up side edges of the text body sheets 420 that are sequentially fed from the sheet feeding unit 310. The front edges of the text body sheets 420 are evened up by contacting with the alignment end fence 3 54 when each of the text body sheets 420 slides into the text body sheet stacker 350. The front edges of the text body sheets 420 are evened up, so that end edges of the text body sheets 420 are also subject to be evened up. When all the text body sheets 420 are stacked on the stacking tray 352, the side edges of the text body sheets 420 are evened up by an alignment operation of the alignment side fences 356 (for example, narrowing distance therebetween, or jogging like a paper jogger).

[0026] The edges of the text body sheets 420 are evened up, so that the text body sheets 420 are stacked in the text body sheet stacker 350 as a sheet stack 430 (see Fig. 5B). Thickness of the sheet stack 430 is detected by a sheet stack thickness detection sensor 358 provided on the text body sheet stacker 350. In addition, the text body sheet stacker 350 (the stacking tray 352) can swingably rotates between an aligning position (see Fig. 5A) for receiving the text body sheets 420 and a hand-over position (see Fig. 5D) for handing over the sheet stack 430 to a clamper 370. The text body sheet stacker 350 is swingably rotated by a swing mechanism (not shown) provided on or near the text body sheet stacker 350.

[0027] In the clamper 370, provided is a clamping mechanism for clamping the sheet stack 430 at the time when the text body sheet stacker 350 is rotated at the hand-over position. The clamper 370 can move between a receiving position for receiving the sheet stack 430 from the text body sheet stacker 350 and a binding position for folding the cover sheet 410 over the sheet stack 430. The clamper 370 is moved by a slide mechanism (not shown) provided on or near the clamper 370. In addition, a gluing unit 360 is provided adjacent to the clamper 370 located at the receiving position. The gluing unit 360 includes a glue tank 364 for containing hot-melt adhesive and gluing rollers 362 for pasting the hot-melt adhesive onto a spine of the sheet stack 430.

[0028] The binding unit 380 includes a cover sheet tray 384. The cover sheet 410 fed from the sheet feeding unit 310 is laid on the cover sheet tray 384 with aligned at its appropriate position. In addition, the binding unit 380 includes also includes a folding unit 382. The folding unit 382 folds the cover sheet 410 laid on the cover sheet tray 384 over the sheet stack 430 located at the binding position by the clamper 370 to bind the cover sheet 410 with the sheet stack 430 by the hot-melt adhesive. A booklet 440 is made by binding the cover sheet 410 with the sheet stack 430 (text body sheets 420).

[0029] A booklet ejector 390 is provided beneath the binding unit 380. The booklet 440 bound at the binding unit 380 is sent to the booklet ejector 390. The plural booklets 440 can be temporally stored on the booklet ejector 390. Note that, in the present embodiment, the booklet 440 freely falls to the booklet ejector 390 from the binding unit 380.

[0030] As shown in Fig. 2, in the sheet feeding unit 310, the cutting unit 330, (a pair of) first feed rollers 312, (a pair of) second feed rollers 314, (a pair of) feed reference rollers 316 and (a pair of) feed reference support rollers 322 are provided in this order from upstream. A feed reference encoder 318 is provided in one of the feed reference rollers 316 for controlling a feed length of the cover sheet 410. In addition, a cover sheet size sensor 320 is provided between the feed reference rollers 316 and the feed reference support rollers 322 for detecting a length of the cover sheet 410 along the feed path of the sheets.

[0031] The feed path change-over mechanism 338 is provided between the first feed rollers 312 and the second feed rollers 314. The feed path change-over mechanism 338 can be rotated based on a change-over reference point 338C by a drive mechanism (not shown) to change over the feed path of the sheets between a default feed path 338A and a cutting feed path 338B. According to the default feed path 338A, the sheet is fed between the first feed rollers 312 and the second feed rollers 314. On the other hand, according to the cutting feed path 338B, the sheet is fed between the second feed rollers 314 and the cutting unit 330.

[0032] In the cutting unit 330, cutting support rollers 336, a cutter 334 and a trash box 332 are provided in this order from a side close to the feed path change-over mechanism 338. The cutter 334 is a shuttle cutter and cuts the cover sheet 410 by shuttling its blade in a width direction of the cover sheet 410. The cutting support rollers 336 hold the cover sheet 410 when the cutter 334 cuts the cover sheet 410. The trash box 332 receives a waste portion 410B (see Fi g. 7H) of the cover sheet 410

after cutting and is made removal for a user to discard the waste portions 410B accumulated therein.

[0033] As shown in Fig. 3, the image-forming system 100 further includes a controller 290, and the controller 290 is provided with a cutting length calculation unit 292 for calculating a cutting length of the cover sheet 410 and a memory unit 294 for storing a sheet size, etc. The controller 290 controls the image-forming machine 200 and the binding machine 300 based on data from the input panel 270, the feed reference encoder 318, the cover sheet size sensor 320 and the sheet stack thickness detection sensor 358.

[0034] Next, operations of the image-forming system 100 will be explained with reference to Figs. 4 and 5A to 5F.

[0035] When the start button on the input panel 270 is pushed (touched) to make the booklet 440, an operation of printing the text-block sheets 420 is done first. The text-block sheets 420 stacked on the first sheet supply tray 220A are fed to the image-forming unit 230 sheet by sheet, and the image-forming unit 230 forms (prints) images and/or texts on the text-block sheets 420 based on the text body image data. The text body sheet 420 on which images are formed are fed to the text body sheet stacker 350 through the feed through pathway 260 and the sheet feeding unit 310 as shown in Fig. 5A (step S10).

[0036] In the text body sheet stacker 350, the text body sheets 420 are sequentially stacked on the stacking tray 352. The front edges of the text body sheets 420 are evened up by contacting with the alignment end fence 354 when each of the text body sheets 420 slides into the text body sheet stacker 350. The front edges of the text body sheets 420 are evened up, so that the end edges of the text body sheets 420 are also subject to be evened up. When all the text body sheets 420 are stacked on the stacking tray 352, the side edges of the text body sheets 420 are evened up by the alignment operation of the alignment side fences 356 as shown in Fig. 5B (step S20). The thickness of the sheet stack 430 (the evened-up text body sheets 420) is detected by the sheet stack thickness detection sensor 358 (step S30).

[0037] After all the text body sheets 420 are printed, a next operation of printing the cover sheet 410 is started. One of the cover sheets 410 stored in the first sheet supply unit 210 is fed to the image-forming unit 230, and the image-forming unit 230 forms (prints) images and/or texts on the cover sheet 410 based on the cover sheet image data. The cover sheet 410 on which images are formed is fed to the sheet feeding unit 310 (step S40).

[0038] In the sheet feeding unit 310, a cutting length calculation process (step S50), a cleaning process (step S70) and a cover sheet cutting process (step S80) are done with the cover sheet 410. Those processes S50, S70 and S80 are explained later in detail with reference to flow charts shown in Figs. 6A to 6C. After the step S80, the cover sheet 410A that has been cut into a desired size is fed to the binding unit 310 as shown in Fig. 5C, and its waist 410B is discarded into the trash box 332.

[0039] Note that a cleaning flag is set to "ON" when the number of printed sheet reaches to a predetermined value, and reset to "OFF" when the cleaning process ends (step S75). Only when the cleaning flag is set to "ON" (Yes in Step S60), the cleaning process is done (step S70). On the other hand, when the cleaning flag is set to "OFF" (No in Step S60), a sheet cover cutting process is done (step S80) next without an execution of the cleaning process.

[0040] Subsequently, the stacking tray 352 that holds the sheet stack 430 is swung from the alignment position to the had-over position in order to hand over the sheet stack 430 to the clamper 370 as shown in Fig. 5D. The clamper 370 that received and holds the sheet stack 430 is moved from the receiving position to the binding position. During this movement, the spine of the sheet stack 430 is contacted with an uppermost one of the gluing rollers 362, so that the hot-melt adhesive is pasted onto the spine of the sheet stack 430 (step S90).

[0041] When the clamper 370 reaches to the binding position as shown in Fig. 5E, the sheet stack 430 with the hot-melt adhesive pasted and the cover sheet 410A that has been cut into the desired size are aligned with each other, and the folding unit 382 folds the cover sheet 410 laid on the cover sheet tray 384 over the sheet stack 430 to make the booklet 440. Then, the folding unit 382 releases the booklet 440, so that the booklet 440 freely falls down to the booklet ejector 390 as shown in Fig. 5F (step S100).

[0042] It is judged whether or not the number of the made-up booklets 440 reach to a target quantity (step S110). If the target quantity is not achieved (No in step S110), the above processes are repeated. If the target quantity is achieved (Yes in step S110), the process flow is terminated.

[0043] Note that, in the present embodiment, the cleaning process is done every time when the number of printed sheet reaches to the predetermined value. However, the cleaning process may be done at an appropriate time determined based on estimated contamination of the feed rollers. The contamination of the feed rollers can be estimated based on an image occupancy rate of the image data used for printing and the number of printed sheets. Alternately, the cleaning process may be done based on a user's arbitrary command input via the input panel 270. The user's arbitrary command can set the cleaning flag to "ON" or "OFF".

[0044] The cutting length calculation process (step S50), the cleaning process (step S70) and the cover sheet cutting process (step S80) will be explained with reference to Figs. 6A to 6C and 7A to 7H.

[0045] First, the cutting length calculation process will be explained with reference to a flow chart shown in Fig. 6A. When the cover sheet 410 is fed to the sheet feeding unit 310 as shown in Fig. 7A, the feed rollers are driven forwardly to feed the cover sheet 410 downstream (step S210: feed in a forward direction A shown in Fig. 7A). Upon detecting a start edge of the cover sheet 410 by

the cover sheet size sensor 320, it is started to count the number of pulses output from the feed reference encoder 318.

[0046] When the cover sheet size sensor 320 detects an end edge of the cover sheet 410 as shown in Fig. 7B (step S220), feeding of the cover sheet 410 (rotations of the feed rollers) is stopped (step S230). Then, a length of the sheet cover 410 is calculated based on the number of pulses output from the feed reference encoder 318 counted in the step S220 (step S240). Here, the number of pulses output from the feed reference encoder 318 indicates a feed length, so that the number of pulses counted in step S220 indicates the length of the sheet cover 410.

[0047] Subsequently, the cutting length calculation unit 292 calculates the cutting length of the cover sheet 410 to be cut away based on the length of the cover sheet 410, the length of the text-block sheet(s) 420 and the thickness of the sheet stack 430 (step S250). Specifically, the cutting length is calculated by subtracting a total of twice of the length of the text-body sheet 420 and the thickness of the sheet stack 430 from the length of the sheet cover 410. Note that fixed-size papers such as A4-size papers are used as the text-body sheets 420, so that the length of the text-body sheet 420 is stored in the memory unit 294. However, the length of the text-body sheet 420 may be detected similarly to the length of the cover sheet 410 as explained above. The length of the cover sheet 410 may be preliminarily stored in the memory unit 294 based on a user's input via the input panel 270.

[0048] Next, the cleaning process will be explained with reference to a flow chart shown in Fig-6B. Here, it is assumed that the first feed rollers 312 are to be cleaned. The feed rollers are driven reversely until the end edge of the cover sheet 410 reaches to a cleaning position where the end edge of the cover sheet 410 is nipped between the first feed rollers 312 as shown in Fig. 7C (step S310: feed in a reverse direction *B* shown in Fig. 7C).

[0049] Then, rotations of the feed rollers is temporarily stopped as shown in Fig. 7D, but only the first feed rollers 312 are continued to be driven reversely for a predetermined duration time. At this time, the feed reference rollers 316 hold the cover sheet 410 with a nipping pressure greater than a feeding force by the first feed rollers 312, so that the first feed rollers 312 spin in contact with the held cover sheet 410. Therefore, contamination on circumferential surfaces of the first feed rollers 312 is wiped away (step S320). Note that an area of the cover sheet 410 that wipes away the contamination is located within an end portion of the cover sheet 410 to be cut away and then discarded as the waste portion 410B.

[0050] Upon completing the cleaning operation, all the feed rollers are driven forwardly again to feed the cover sheet 410 to a change-over waiting position as shown in Fig. 7E (step S330: feed in the forward direction *A*). The change-over waiting position is a position where the end edge of the cover sheet 410 has just passed over the feed path change-over mechanism 338.

[0051] Next, the cutting process will be explained with reference to a flow chart shown in Fig. 6C. The feed path change-over mechanism 338 is rotated based on the change-over reference point 338C by the drive mechanism (not shown) to change over the feed path of the sheets from the default feed path 338A to the cutting feed path 338B as shown in Fig. 7F. Then, the cutting feed path 338B forms a feed path connecting between the second feed rollers 314 and the cutting support rollers 336 (step S410).

[0052] Subsequently, the feed rollers are driven reversely to feed the cover sheet 410. to a cutting position a shown in Fig. 7G (step S420: feed in the reverse direction B). The cutting position is determined based on the cutting length calculated by the cutting length calculation unit 292. When the cover sheet 410 is fed to the cutting position, rotations of the feed rollers are stopped and then the cover sheet 410 is cut (step S430). The waste portion 410B that has been cut away drops into the trash box 322 as shown in Fig. 7H. The cover sheet 410A that has been cut into a desired size is fed to the binding unit 380 by forward rotations of the feed rollers (step S440).

[0053] As explained above, rollers to be cleaned (the first feed rollers 312 in the present embodiment) nip the waste portion 410B to be cut off and then discarded, and then spin in contact with the feed rollers, so that the contamination on the feed rollers can be wiped away by the waste portion 410B.

[0054] According to the image-forming system 100, the cleaning operation of the feed rollers to be cleaned is done by effectively utilizing the waste portion of the cover sheet to be discarded, so that the feed rollers in the sheet feeding unit can be cleaned without degrading an appearance of a booklet, without the need for using an extra cleaning sheet and without degrading use's convenience.

[0055] Note that the first feed rollers 312 located most upstream in the sheet feeding unit 310 are cleaned in the above embodiment, but the feed rollers other that the first feed rollers 312 can be cleaned similarly. For example, the second feed rollers 314 may be cleaned after the cleaning of the first feed rollers 312. In this case, it is preferable for the second feed rollers 314. to nip another area on the cover sheet 410 than the area nipped by the first feed rollers 312 in order to prevent the second feed rollers 314 from being tainted due to the contaminant wiped away from the first feed rollers 312.

[0056] The cover sheet 410 is held by a nipping pressure force of the feed reference rollers 316 during the cleaning operation in the above embodiment. However, the cover sheet 410 may be held during the cleaning operation by any other means that can hold the cover sheet 410 greater than a feeding force by feed rollers to be cleaned. In addition, there is no need to hold the cover sheet 410 by (a pair of) rollers during the cleaning operation. An extra clamper for holding the cover sheet 410 during the cleaning operation may be provided independ-

ently. This clamper does not feed the sheets and is provided only for holding the cover sheet 410 during the cleaning.

[0057] Note that the above explanations are made by referring to the image-forming system 100 including the binding machine 300. However, the present invention can be applied to an image-forming system including only an image-forming machine. For example, in a case where printing of A4-size papers is planned, there are no A4-size papers, but there are only A3-size papers. The image-forming machine may cut the A3-size papers for printing and clean feed rollers using waste portions of the A3-size papers to be cut off.

Claims

1. An image-forming system (100) comprising:

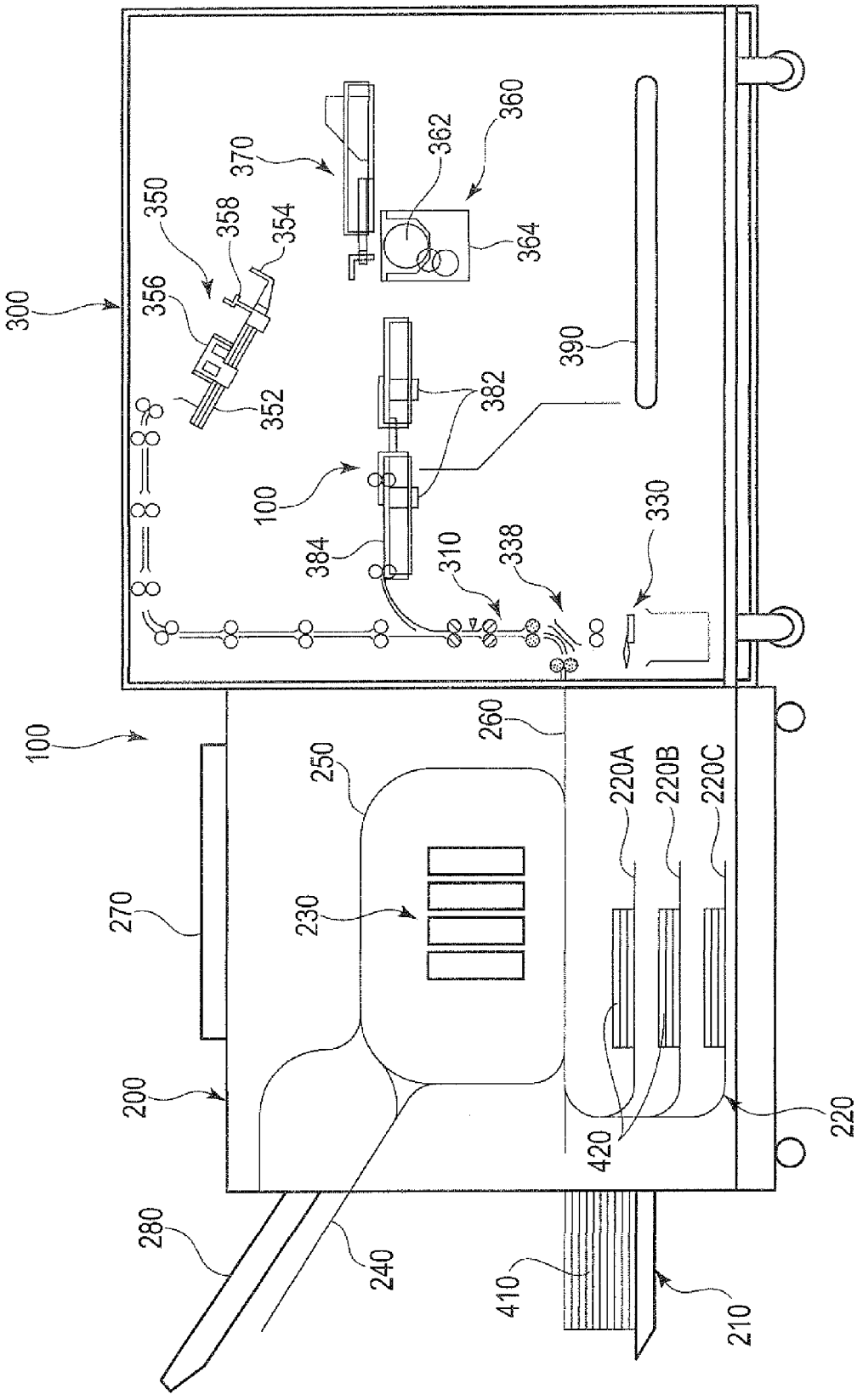
an image-forming unit (230) for forming an image on a sheet (410, 420);
a sheet feeding unit (310) including at least a pair of feed rollers (312) for feeding the sheet (410, 420) on which the image has been formed;
a cutting unit (330) for cutting away a waste portion (410B) of the sheet (410); and
a controller (290) operable to controlling the sheet feeding unit (310) for a cleaning operation of the pair of feed rollers (312), before the waste portion (410B) is cut away, so as to hold the sheet (410) and drive the pair of feed rollers (312) in contact with the waste portion (410B) of the sheet (410).

2. An image-forming system (100) according to claim 1, **characterized in that**
the sheet feeding unit (310) includes the pair of feed rollers (312) to be cleaned up and a pair of reference rollers (316) that holds the sheet (410) by nipping with a nipping pressure greater than a feeding force by the pair of feed roller (312) to be cleaned up, and
the controller (290), by controlling the sheet feeding unit (310) in the cleaning operation, feeds the sheet (410) to a cutting position where the waste portion (410B) to be cut away is nipped by the pair of reference rollers (316), stops rotation of the pair of reference rollers (316) to hold the sheet (410) with the nipping pressure, and spins the pair of feed rollers (312) in each rotational direction so as to feed the sheet (410) away from the pair of reference rollers (316).

3. An image-forming system (100) according to claim 2, **characterized in that**
the pair of feed rollers (312) to be cleaned up is located most upstream along a feed path of the sheet (410) in the sheet feeding unit (310).

4. An image-forming system (100) according to claim 2 or 3, **characterized in that** the sheet (410, 420) is classified to a cover sheet (410) or a text-block sheet (420),
the system (100) further comprises a text body stacker (350) that receives the text-block sheet (420) sequentially fed from the sheet feeding unit (310) and evens up edges thereof to form a sheet stack (430), and a binding unit (380) that binds the sheet stack (430) with the cover sheet (410A) of which the waste portion (410B) has been cut away by the cutting unit (330) to make a booklet (440), and
the controller (290), by controlling the sheet feeding unit (310), calculates a length of the waste portion (410B) based on a length of the cover sheet (410), a length of the text-block sheet (420) and a thickness of the sheet stack (430), and feeds the cover sheet (410) to the cutting position based on the calculated length of the waste portion (410B).

FIG.1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310
338
330
100
260
250
220A
220B
220C
270
230
200
220
420
280
240
410
210

FIG.2

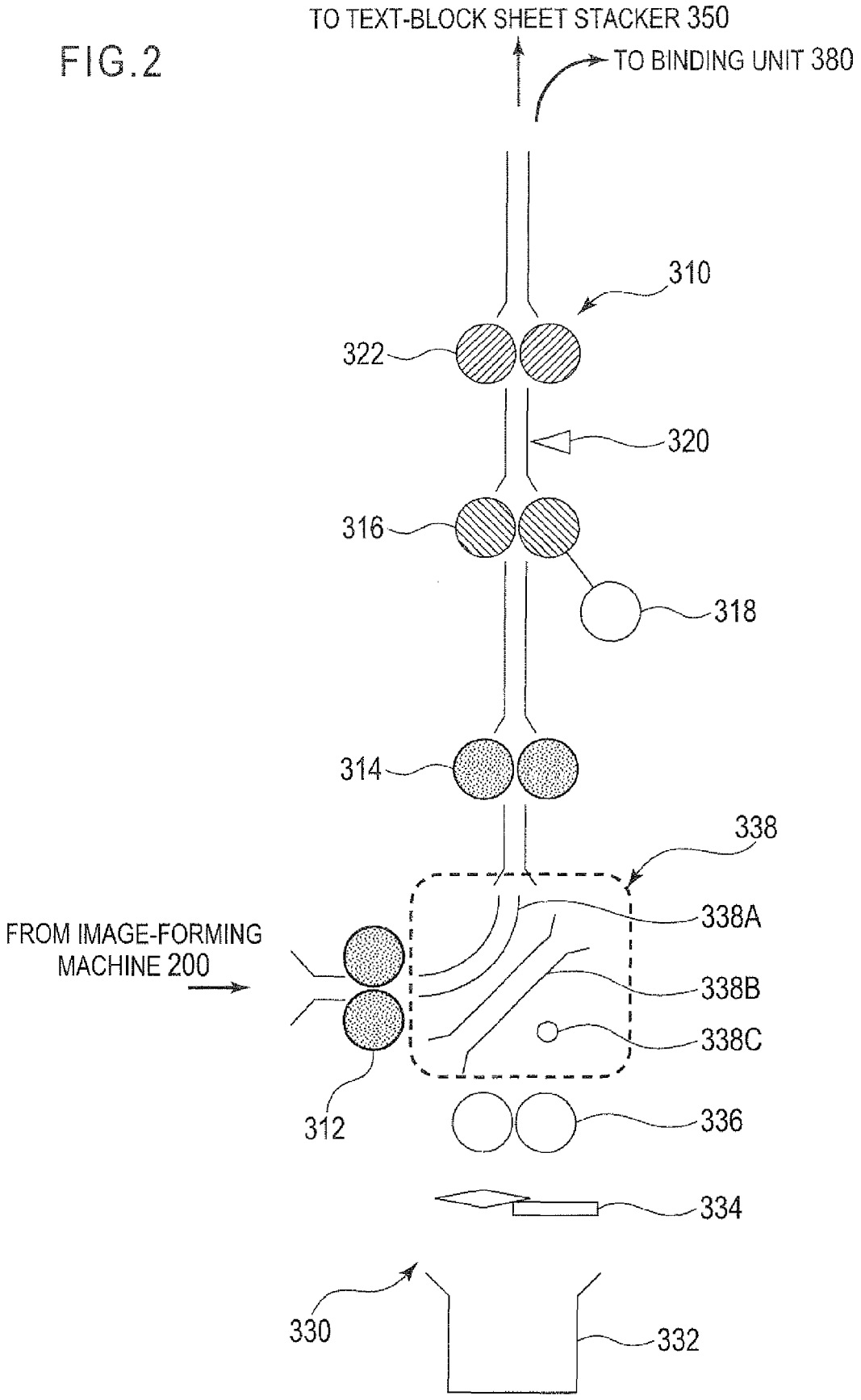

TO TEXT-BLOCK SHEET STACKER 350
TO BINDING UNIT 380
310
322
320
316
318
314
338
338A
FROM IMAGE-FORMING MACHINE 200
338B
338C
312
336
334
330
332

FIG.3

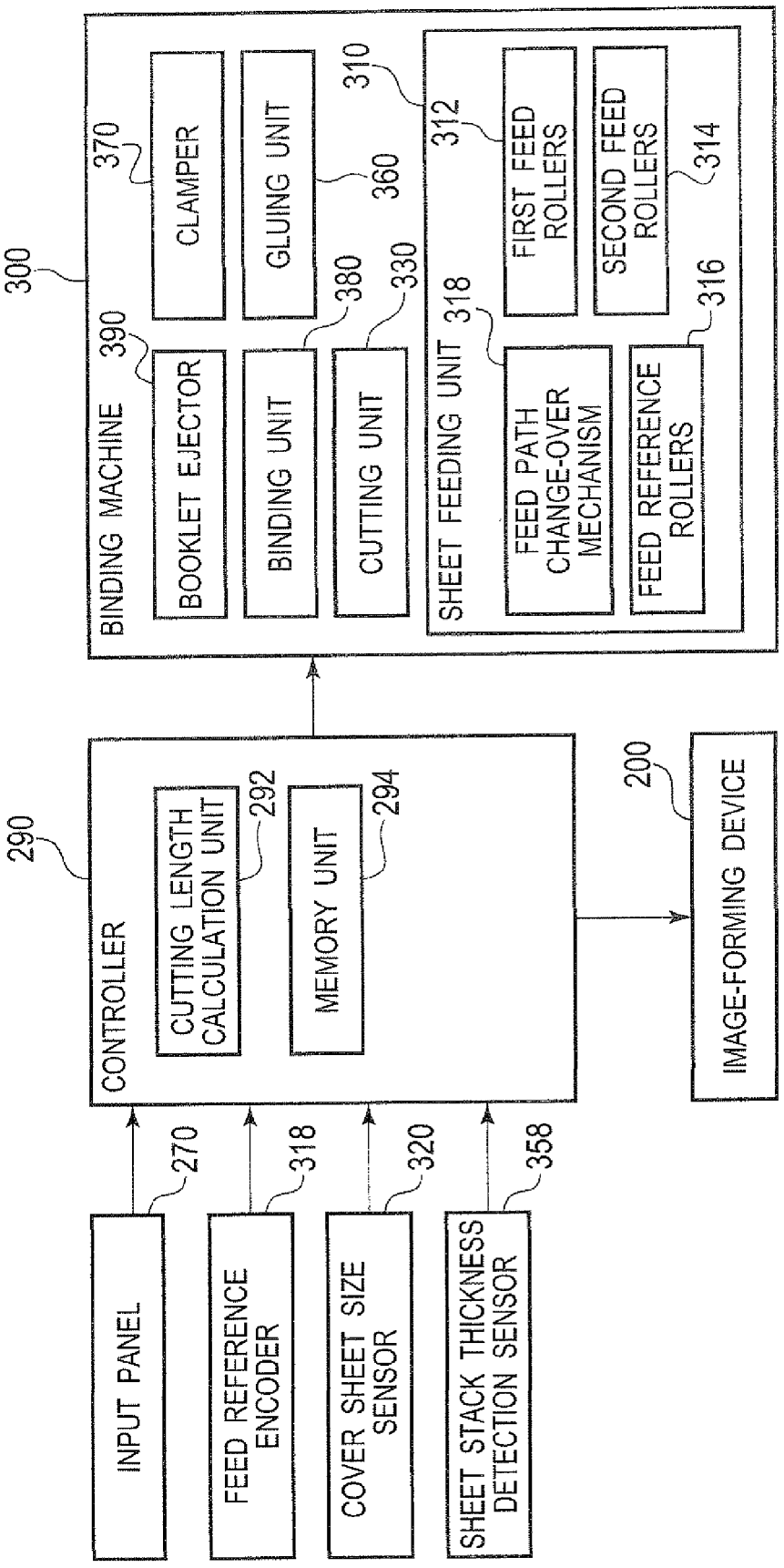

300
BINDING MACHINE
370
CLAMPER
360
GLUING UNIT
310
390
BOOKLET EJECTOR
380
BINDING UNIT
330
CUTTING UNIT
SHEET FEEDING UNIT
312
318
FEED PATH CHANGE-OVER MECHANISM
FIRST FEED ROLLERS
314
SECOND FEED ROLLERS
316
FEED REFERENCE ROLLERS
290
CONTROLLER
292
CUTTING LENGTH CALCULATION UNIT
294
MEMORY UNIT
200
IMAGE-FORMING DEVICE
270
INPUT PANEL
318
FEED REFERENCE ENCODER
320
COVER SHEET SIZE SENSOR
358
SHEET STACK THICKNESS DETECTION SENSOR

FIG.4

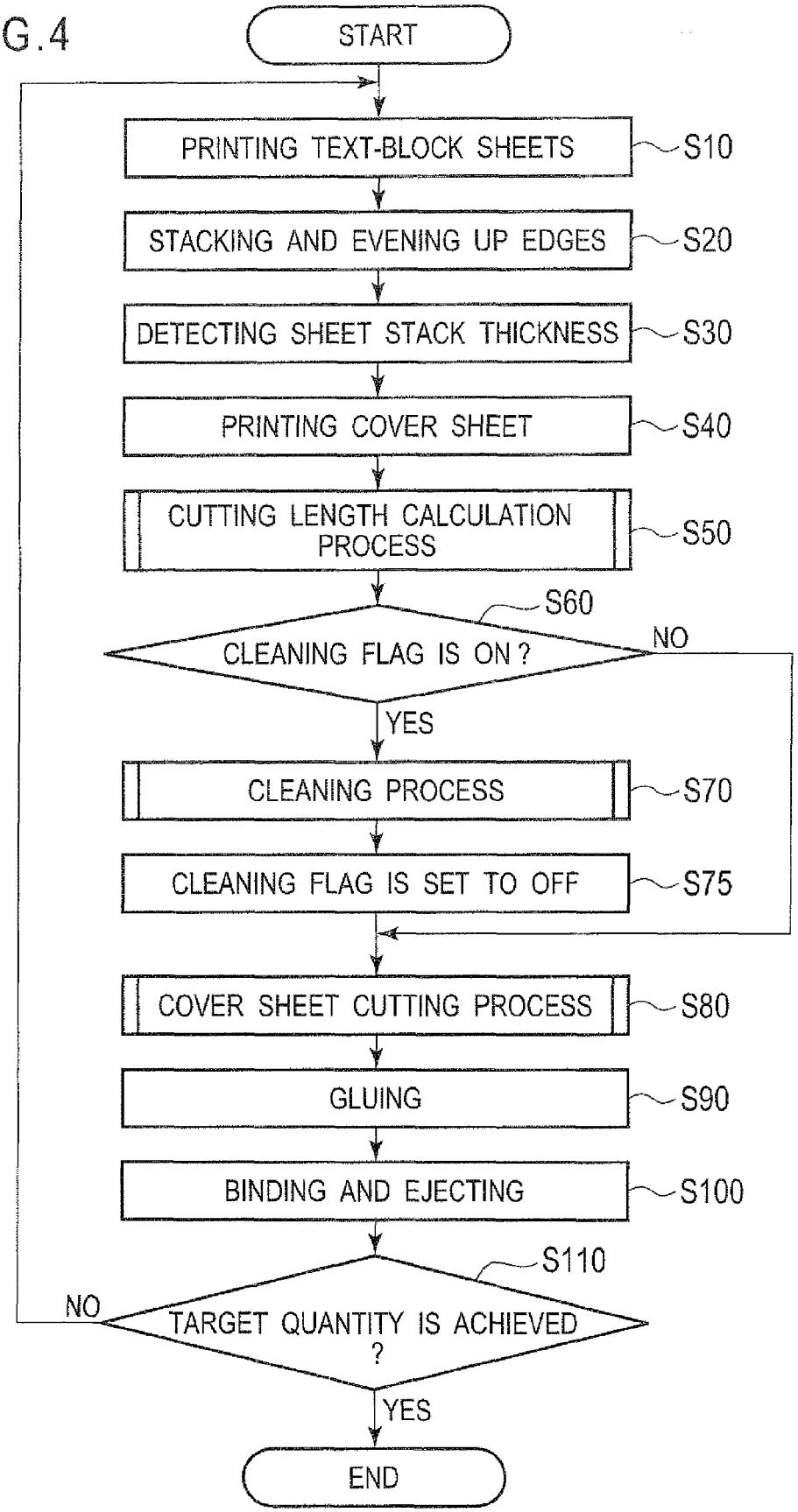

START
PRINTING TEXT-BLOCK SHEETS
S10
STACKING AND EVENING UP EDGES
S20
DETECTING SHEET STACK THICKNESS
S30
PRINTING COVER SHEET
S40
CUTTING LENGTH CALCULATION PROCESS
S50
S60
CLEANING FLAG IS ON ?
NO
YES
CLEANING PROCESS
S70
CLEANING FLAG IS SET TO OFF
S75
COVER SHEET CUTTING PROCESS
S80
GLUING
S90
BINDING AND EJECTING
S100
S110
NO
TARGET QUANTITY IS ACHIEVED ?
YES
END

FIG.5A

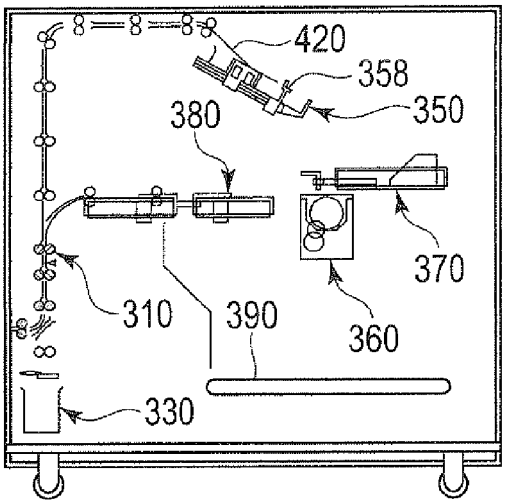


FIG.5B

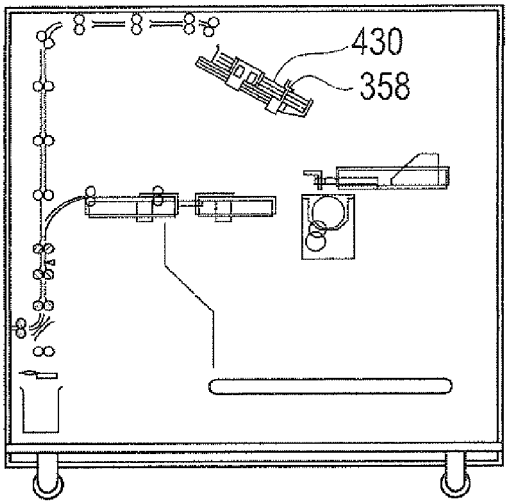


FIG.5C

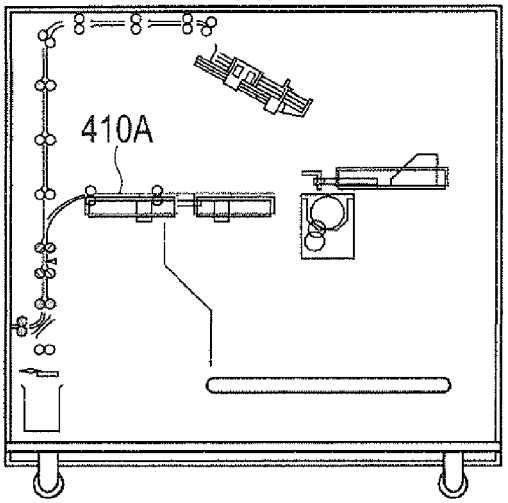


FIG.5D

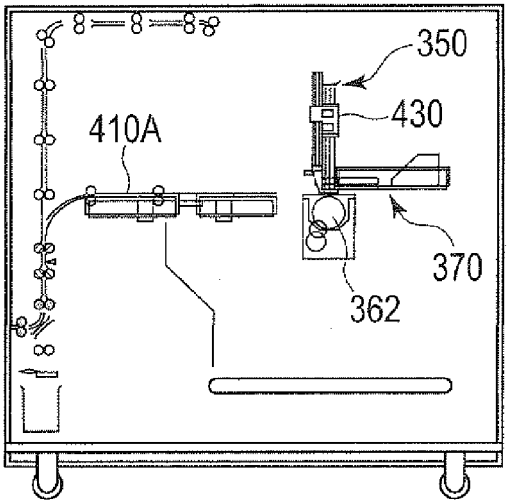


FIG.5E

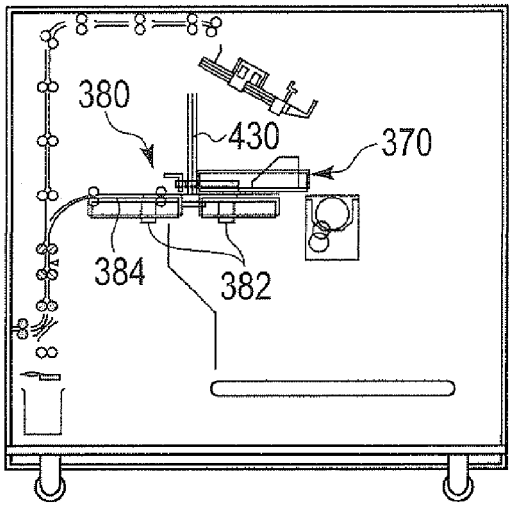


FIG.5F

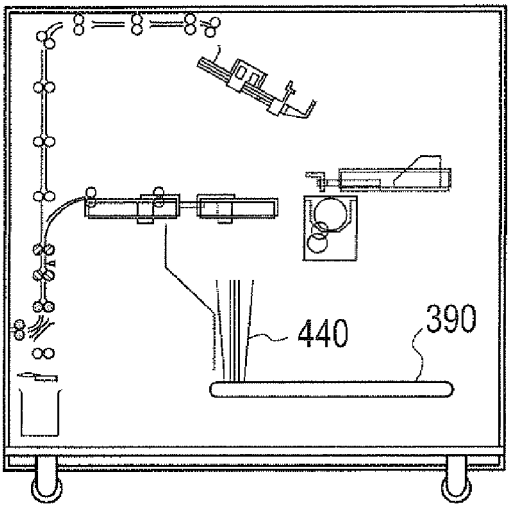


FIG.6A

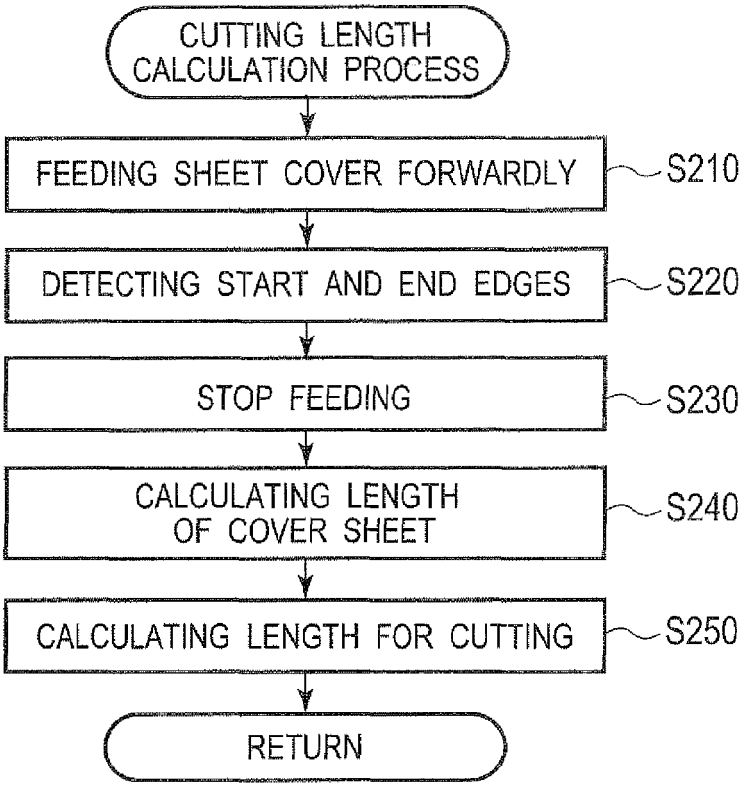

CUTTING LENGTH CALCULATION PROCESS
FEEDING SHEET COVER FORWARDLY
S210
DETECTING START AND END EDGES
S220
STOP FEEDING
S230
CALCULATING LENGTH OF COVER SHEET
S240
CALCULATING LENGTH FOR CUTTING
S250
RETURN

FIG.6B

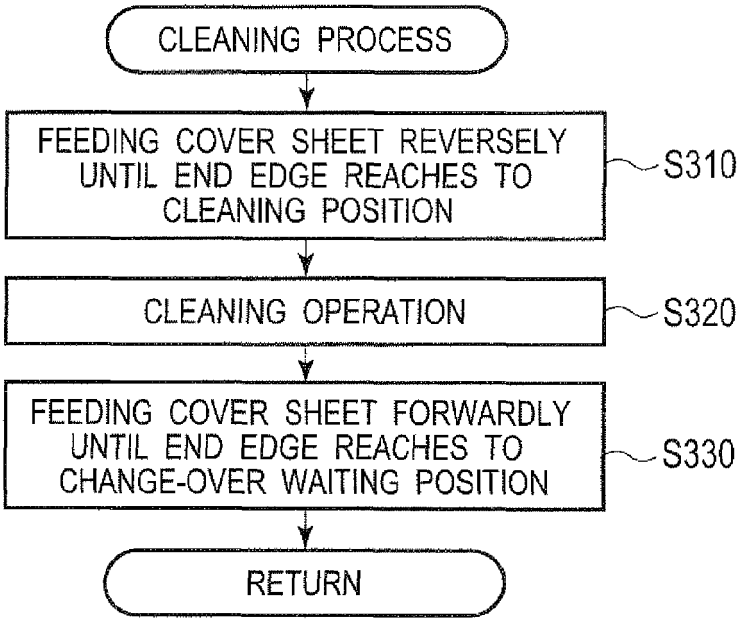

CLEANING PROCESS
FEEDING COVER SHEET REVERSELY UNTIL END EDGE REACHES TO CLEANING POSITION
S310
CLEANING OPERATION
S320
FEEDING COVER SHEET FORWARDLY UNTIL END EDGE REACHES TO CHANGE-OVER WAITING POSITION
S330
RETURN

FIG.6C

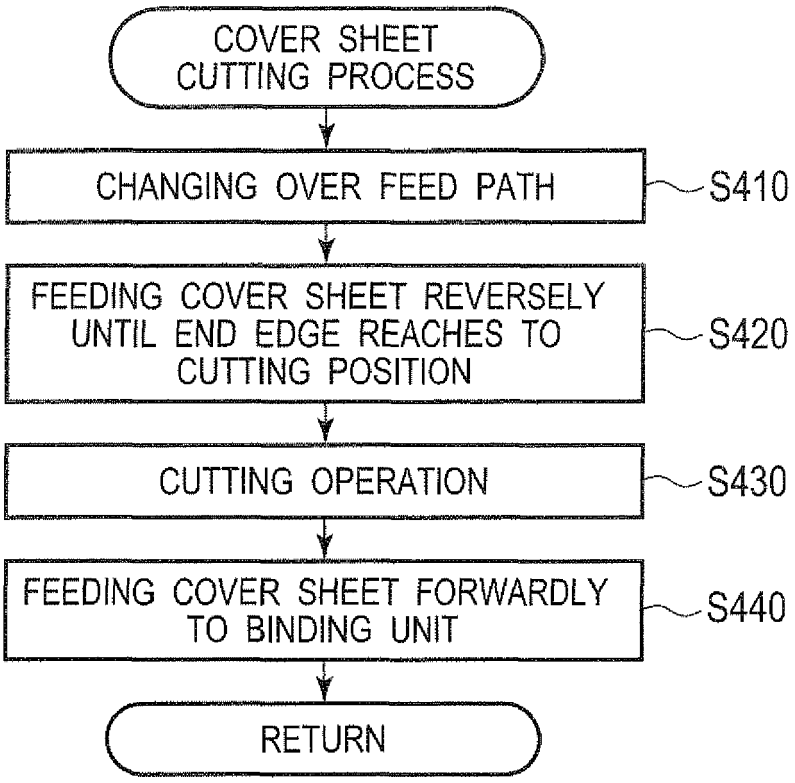

COVER SHEET CUTTING PROCESS
CHANGING OVER FEED PATH
S410
FEEDING COVER SHEET REVERSELY UNTIL END EDGE REACHES TO CUTTING POSITION
S420
CUTTING OPERATION
S430
FEEDING COVER SHEET FORWARDLY TO BINDING UNIT
S440
RETURN

FIG.7A

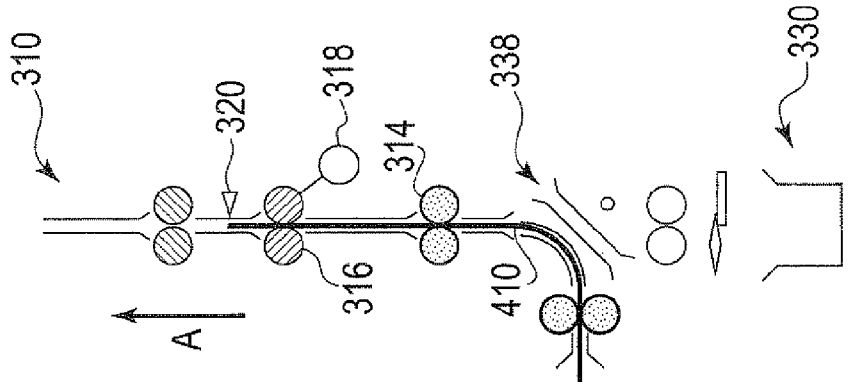


FIG.7B

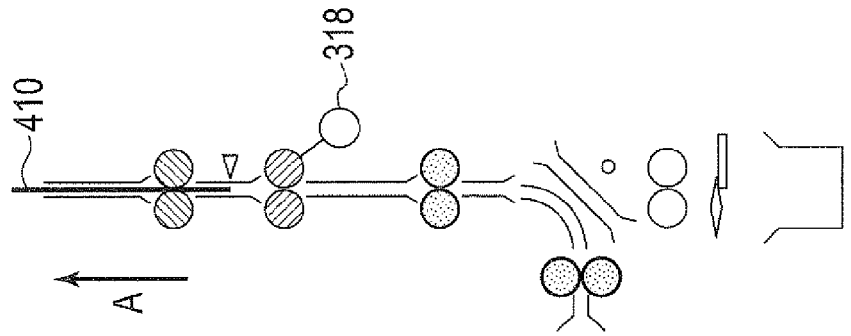


FIG.7C

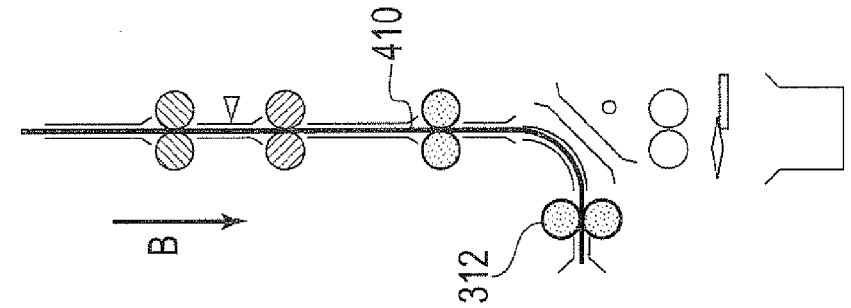


FIG.7D

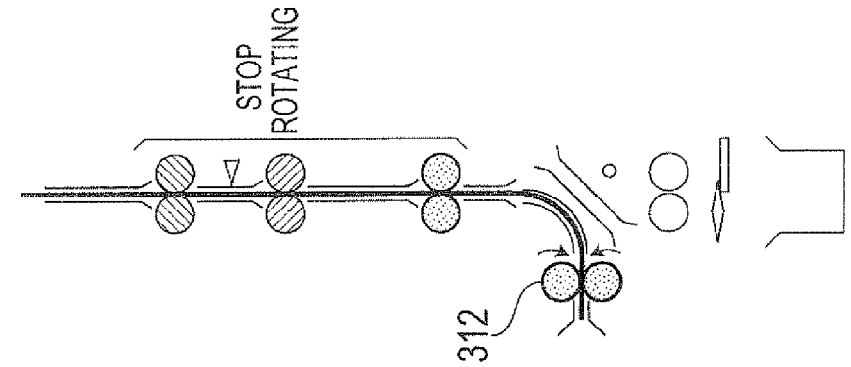


FIG.7H

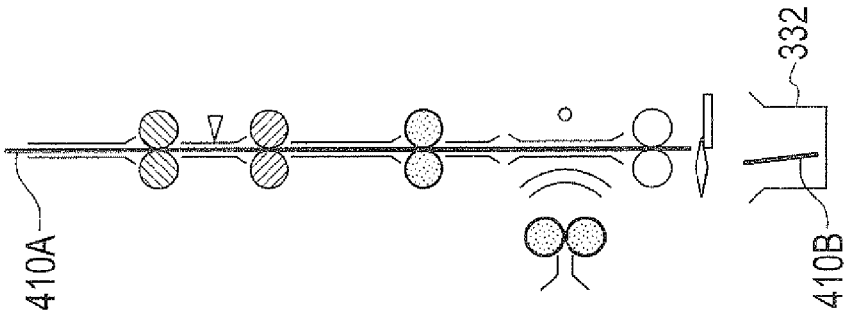


FIG.7G

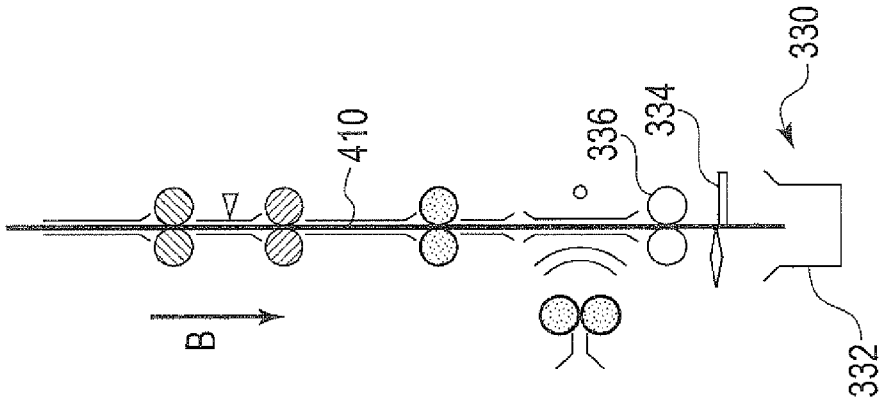


FIG.7F

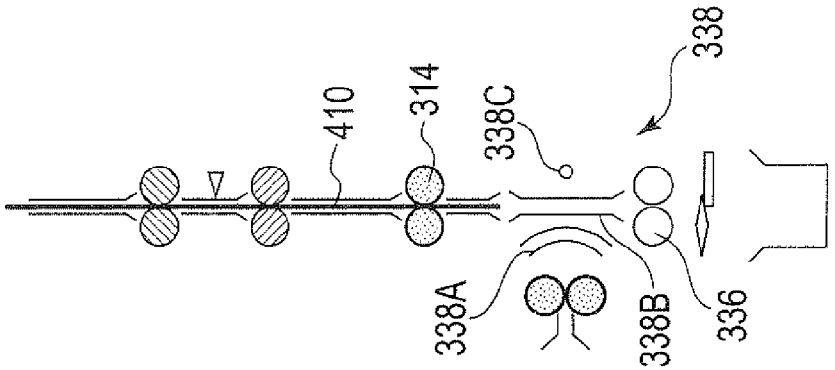
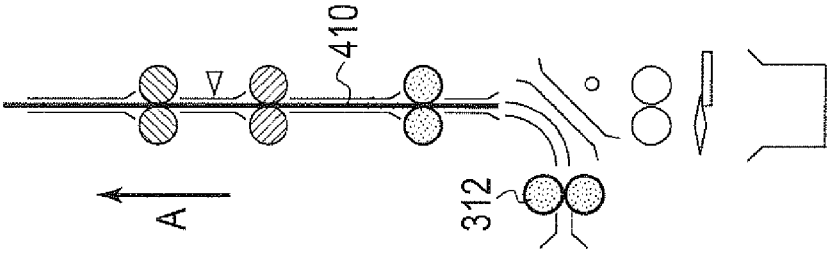


FIG.7E



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Patent documents cited in the description

- JP 2004209869 A **[0003]**
- JP 2009051618 A **[0005]**