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(54) **PAPER TREATING DEVICE**

(57) An object of the present invention is to provide a paper sheet handling device capable of greatly reducing an amount of paper sheets which cannot be accumulated and which are accumulated in an OVF and capable of improving operation efficiency. A sorter has the certain number of stackers with respect to a specific division designating area. The fifth, tenth, fifteenth, and twentieth stackers of stage A, and the twentieth stacker of stage B are assigned to preliminary stackers. For example, when a stacker A08 becomes full, the nearest preliminary stacker A10 is used for tentative accumulation. When the full-state of the stacker A08 is cancelled, the tentative accumulation into the stacker A10 is discontinued, and the accumulation into the stacker A08 is resumed.

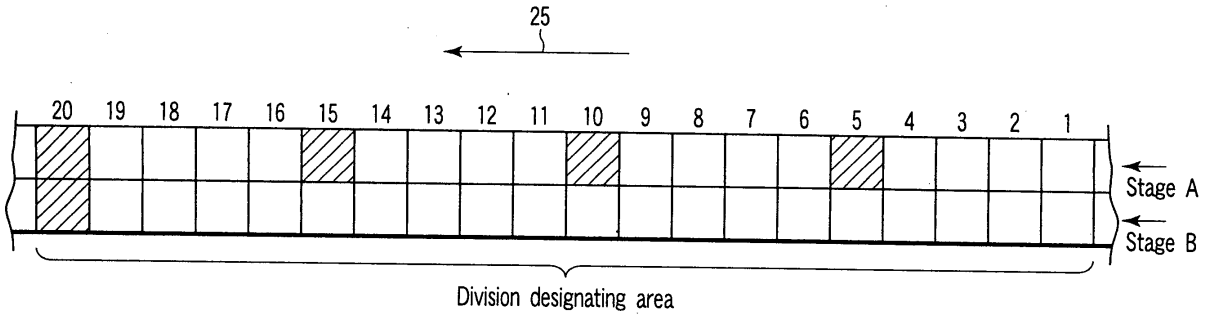

FIG. 4

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Description

Technical Field

[0001] The present invention relates to a paper sheet handling device which reads division information described on paper sheets to sort and accumulate the paper sheets based on the read information.

Background Art

[0002] Heretofore, as a paper sheet handling device, there has been known a mail handling sorter having a large number of stackers for sorting postal matters. This sorter also has an overflow stacker (hereinafter referred to as an OVF) for accumulating postal matters which cannot be accumulated in the respective stackers.

[0003] When the stacker breaks during an operation of the sorter, the sorter cannot be used until the stacker has been repaired. Therefore, the postal matters distributed to the stacker incapable of accumulating the postal matters are accumulated in the OVF.

[0004] Since the postal matters accumulated in the OVF in this manner are a mixture of the postal matters having different divisions, an operator needs to manually sort the postal matters after completing the sorting. Alternatively, the postal matters need to be put into the sorter again. When many paper sheets are accumulated in the OVF, there is a problem that an operation efficiency drops.

[0005] In recent years, a multi-stacker system (see, e.g., Jpn. Pat. Appln. KOKAI Publication No. 2003-136022) has been adopted to solve the problem. In this multi-stacker system, from the start, a plurality of stackers are assigned for sorting the postal matters to be distributed to a specific district or corporation having a large handling amount of postal matters. When one stacker is filled, the postal matters are accumulated in the next stacker.

[0006] However, even in a case where this multi-stacker system is adopted, since the number of the stackers to be assigned first is fixed, the postal matters that cannot be accumulated owing to breakdown of the stacker or the like have to be accumulated in the OVF. After all of the stackers are filled, the postal matters are accumulated in the OVF. Therefore, even when the multi-stacker system is adopted, it is not possible to solve the above-described problem that the operation efficiency drops.

Disclosure of Invention

[0007] An object of the present invention is to provide a paper sheet handling device capable of largely reducing an amount of paper sheets which cannot be accumulated as assigned and which are accumulated in an OVF and capable of improving an operation efficiency.

[0008] To achieve the above-described object, in the present invention, a paper sheet handling device has: a plurality of accumulating sections arranged along a conveyance direction of paper sheets; a detecting section which detects incapability to accumulate the paper sheets into the accumulating sections; preliminary accumulating sections disposed between the plurality of accumulating sections; and a control section which accumulates the paper sheets to be accumulated in the accumulating sections into the nearest preliminary accumulating section on a downstream side of the accumulating section along the conveyance direction, when the detecting section detects the incapability to accumulate the paper sheets.

[0009] Moreover, in the present invention, the paper sheet handling device comprises: readout means for reading images of paper sheets; recognition means for recognizing division information constituted of a postal code or an address described in the read image read by this readout means; a sorting section having a stacker including a plurality of usual and preliminary stackers for sorting and accumulating the paper sheets based on a result of recognition of the division information by this recognition means, and a stacker display section which displays states of the paper sheets accumulated in the stacker; detection means disposed in this sorting section to detect an amount of the paper sheets accumulated in the stacker; full-state generation processing means for handling the paper sheets, when the detection means detects that the paper sheets accumulated in the usual stackers reach a predetermined amount; preliminary stacker checking means for detecting the state of the preliminary stacker; first preliminary stacker accumulation means for switching the usual stacker to the preliminary stacker to accumulate the paper sheets continuously conveyed to the usual stacker in the preliminary stacker based on a result of the full-state generation processing means, when vacancy of the preliminary stacker is detected based on the judgment result of the preliminary stacker checking means; full-state cancellation means for resetting the usual stacker, when the paper sheets accumulated in the usual stacker are removed in response to the display of the stacker display section; and second preliminary stacker accumulation means for switching the preliminary stacker to the usual stacker to accumulate the paper sheets continuously conveyed to the preliminary stacker in the usual stacker as a result of cancellation, thereby resetting the preliminary stacker.

[0010] Furthermore, the paper sheet handling device of the present invention comprises: readout means for reading images of paper sheets; recognition means for recognizing division information constituted of a postal code or an address described in the read image read by this readout means; a sorting section having a stacker including a plurality of usual and preliminary stackers for sorting and accumulating the paper sheets based on a result of recognition of the division information by this recognition means, and a stacker display section which displays states of the paper sheets accumulated in the stacker; breakdown processing means for detecting

breakdown of the usual stacker from conveyed states of the paper sheets accumulated by the sorting section; preliminary stacker checking means for detecting the state of the preliminary stacker; first preliminary stacker accumulation means for switching the usual stacker to the preliminary stacker to accumulate the paper sheets continuously conveyed to the usual stacker in the preliminary stacker based on a result of the breakdown processing means, when vacancy of the preliminary stacker is detected based on the judgment result of the preliminary stacker checking means; breakdown cancellation means for resetting the usual stacker, when the paper sheets accumulated in the usual stacker are removed in response to the display of the stacker display section; and second preliminary stacker accumulation means for switching the preliminary stacker to the usual stacker to accumulate the paper sheets continuously conveyed to the preliminary stacker in the usual stacker as a result of breakdown cancellation, thereby resetting the preliminary stacker.

Brief Description of Drawings

[0011]

FIG. 1 is a block diagram showing a schematic constitution of a mail handling sorter in an embodiment of the present invention;
FIG. 2 is a partially enlarged schematic diagram showing a structure of a partially enlarged main part of the sorter of FIG. 1;
FIG. 3 is a block diagram of a control system which controls an operation of the sorter of FIG. 1;
FIG. 4 is a schematic diagram showing an example in which some of a plurality of stackers of the sorter of FIG. 1 are assigned to preliminary stackers;
FIG. 5 is a diagram showing a data table in which a preliminary stacker assigning rule of the sorter of FIG. 1 is stored for each division designating area;
FIG. 6 is a data table showing a preliminary stacker assigning example in a specific division designating area;
FIG. 7 is a diagram showing a data table for storing a use situation of the preliminary stacker;
FIG. 8 is a diagram showing a data table for temporarily storing stacker information indicating incapability to accumulate;
FIG. 9 is a diagram showing a data table for setting a flag indicating whether or not all of the stackers are filled;
FIG. 10 is a diagram showing a data table for storing mail shift information;
FIG. 11 is a flowchart showing a handling operation of the sorter of FIG. 1;
FIG. 12 is a flowchart showing a handling operation by the sorter together with FIG. 11;
FIG. 13 is a flowchart showing a subroutine of a preliminary stacker check of FIG. 11;
FIG. 14 is a diagram showing a typical example in which a full stacker is switched to a preliminary stacker;
FIG. 15 is a diagram showing a typical example in which the full stacker is switched to the preliminary stacker;
FIG. 16 is a diagram showing a typical example in which the full stacker is switched to the preliminary stacker;
FIG. 17 is a diagram showing a typical example in which the full stacker is switched to the preliminary stacker;
FIG. 18 is a flowchart showing a handling operation in a case where the stacker breaks;
FIG. 19 is a flowchart showing a handling operation together with FIG. 18; and
FIG. 20 is a flowchart showing a subroutine of the preliminary stacker check of FIG. 18.

Best Mode for Carrying Out the Invention

[0012] A mode for carrying out the present invention will be described hereinafter with reference to the drawings.

[0013] FIG. 1 shows a schematic constitution diagram of a mail handling sorter (hereinafter referred to as the OCR/VCS integrated system [OVIS]) as an embodiment of a paper sheet handling device of the present invention. OVIS handles postal matters such as postcards and letters as paper sheets.

[0014] That is, OVIS reads an image of the postal matter, and recognizes delivery division information (hereinafter referred to simply as division information) such as a postal code and an address included in the read image. Moreover, the recognized division information is barcode-printed on the postal matter with an ink-jet printer (hereinafter referred to simply as an IJP) to accumulate the postal matter in a stacker designated as a delivery division.

[0015] Moreover, as the postal matter whose division information cannot be recognized, image data read from the postal matter is transmitted to a video coding system (hereinafter referred to as a VCS), and an operator inputs the postal code based on the image data. Moreover, the barcode is printed on the postal matter with the IJP based on the postal code input during conveyance of the postal matter, and the postal matter is accumulated in a stacker corresponding to the division.

[0016] To be more specific, as shown in FIG. 1, the OVIS has a supply section 1, a takeout section 2, a discharge accumulating section 3, a barcode readout section 4, a character recognizing section 5 (OCR), a delay conveying section 6, an IJP 7, a barcode readout section 8, a branching section 9, and a division accumulating section 10. The OVIS has a plurality of VCSs 11.

[0017] A plurality of postal matters are set into the supply section 1 by operator's manual operation, and taken out one by one onto a conveyance path (not shown) by

the takeout section 2. In this case, postal matters containing foreign matters or non-standard-size postal matters are excluded to the discharge accumulating section 3. Among the postal matters taken out onto the conveyance path, barcodes applied beforehand to the postal matters which can be handled are read via the barcode readout section 4, and the character recognizing section 5 recognizes division information such as the postal codes and the addresses described on the postal matters. The postal matters which have passed the character recognizing section 5 are conveyed to the delay conveying section 6.

[0018] The delay conveying section 6 is disposed to save a time for subjecting the postal matter whose division information cannot be read by the character recognizing section 5 to VCS operation via a plurality of VCSs 11. That is, in the VCS 11, an image of the postal matter whose division information cannot be read is displayed in a monitor, and the operator key-inputs division information such as the postal code within a certain time.

[0019] Moreover, a special-format barcode is printed on the postal matter via the IJP 7 based on the division information acquired via the barcode readout section 4 and the character recognizing section 5, or the division information acquired by the above-described VCS operation. This barcode is verified and read via the barcode readout section 8.

[0020] Thereafter, the division of the postal matter is judged based on the division information of the postal matter, and accumulated in the stacker (described later) corresponding to the division. In the present embodiment, as to a plurality of stackers of the division accumulating section 10 which are accumulation destinations of the postal matters, two stages of 152 stackers are arranged along a conveyance direction of the postal matters, and the stackers are halfway turned back to an opposite direction. It is to be noted that the stacker on the most downstream side along the conveyance direction of the postal matter is assigned as an overflow stacker (OVF).

[0021] The postal matter whose division has been determined is divided to one of upper and lower stages via a gate (not shown) of the branching section 9, and accumulated in the stacker designated as the division among a large number of stackers disposed in the stages. The postal matter which cannot be accumulated in the designated stacker is accumulated in the OVF.

[0022] FIG. 2 schematically shows a structure of a main part of the division accumulating section 10. Here, there are representatively shown two arranged upper and lower stackers 20a and the corresponding display section 20b. In the division accumulating section 10, all of the stackers 20a have the same structure and function as usual or preliminary stackers as described later. Therefore, in the following description, all of the stackers 20a are denoted with the same reference numeral and described.

[0023] Each stacker 20a has: a gate 29 for directing, to the stacker, the postal matter conveyed along an arrow 25; a backup plate 26 for supporting the postal matter passed through the gate 29 and accumulated in the stacker so as to prevent the matter from falling; and two switches 27, 28 for detecting an amount of accumulated postal matters. One switch 27 is switched when the postal matter having an amount of 75% are accumulated in the stacker, and the other switch 28 is switched when the stacker is filled (100% accumulation).

[0024] The display section 20b has: a full-state lamp 21 for informing that two switches 27, 28 of the corresponding stacker are switched; an LCD 22 for displaying accumulation information such as a delivery district of the postal matter accumulated in the stacker; and a paper tag issuing switch 23 for issuing a paper tag on which the accumulation information is printed. Two stages of the full-state lamps 21, the LCDs 22, and the paper tag issuing switches 23 are disposed corresponding to two upper and lower stackers. It is to be noted that the paper tag issuing switch 23 is an illuminative switch which lights or blinks itself, and also functions as the paper tag lamp 23.

[0025] FIG. 3 shows a block diagram of a control system which controls an operation of the OVIS structured as described above.

[0026] A control unit 30 which controls the operation of the OVIS has a takeout control unit 31 which controls operations of the supply section 1 and the takeout section 2; a foreign matter detection control unit 32 which controls an operation of the discharge accumulating section 3 to exclude the postal matter containing foreign matters and the non-standard-size postal matters; a readout section interface control unit 33 which transmits and receives information such as the postal code with respect to an external device (not shown); a printing control unit 34 which controls the IJP 7 to barcode-print the division information; a conveyance and division control unit 35 which shifts the postal matter to the designated stacker to accumulate the postal matter; and a panel control unit 36 which displays accumulation information of the postal matters and abnormality information of the OVIS via an operation panel.

[0027] The conveyance and division control unit 35 is connected to: a motor driving circuit 40; an encoder input circuit 41; a gate driving circuit 42; a switch control circuit 43; a lamp control circuit 44; an LCD control circuit 45; an a memory circuit 46. The motor driving circuit 40 drives and controls an inverter motor to run a conveyance belt which conveys the postal matters. The encoder input circuit 41 detects a driving speed of the conveyance belt via a rotary encoder. The gate driving circuit 42 drives and controls a gate (not shown) of the branching section 9 and the gate 29 disposed in each stacker. The switch control circuit 43 detects states of a plurality of shift sensors (not shown) arranged in the conveyance path of the postal matter, the switches 27, 28 disposed in each stacker 20a, and the paper tag issuing switch 23 in order to acquire a driving timing of each gate. The lamp control

circuit 44 controls lighting and blinking of the full-state lamp 21 disposed in the display section 20b of each stacker 20a, and the paper tag lamp 23. The LCD control circuit 45 displays the accumulation information (postal code and address) via the LCD 22 disposed in the display section 20b of each stacker. The memory circuit 46 holds a data table in which various types of information are stored.

[0028] FIG. 4 schematically shows an example in which some of two stages of a plurality of (40 stackers in the present embodiment) upper and lower stackers 20a assigned to a specific division designating area are assigned as the preliminary stackers. Here, the stackers assigned to the preliminary stackers are shown by slant lines. In this example, there are assigned, as the preliminary stackers, four stackers including fifth, tenth, fifteenth, and twentieth stackers of the upper stage (stage A), and twentieth stacker of the lower stage (stage B) along the conveyance direction (arrow 25). That is, five preliminary stackers are assigned in this division designating area.

[0029] The postal matters which cannot be accumulated in the usual stacker on an upstream side of each preliminary stacker are temporarily accumulated in the preliminary stacker. In a case where the gate 29 of the usual stacker breaks or the stacker is filled with the accumulated postal matters, the postal matters cannot be accumulated in the usual stacker, and the subsequently sent postal matters are accumulated in the preliminary stacker. That is, the preliminary stacker can be disposed between the usual stackers to greatly reduce the amount of the postal matters accumulated in the OVF.

[0030] For example, the tenth preliminary stacker of the stage A can accumulate the postal matters which cannot be accumulated in the first to fourth usual stackers and the sixth to ninth usual stackers. The postal matters which cannot be accumulated in the first to fourth usual stackers can be accumulated in the fifth preliminary stacker of the stage A, and the postal matters which cannot be accumulated in the sixth to ninth usual stackers can be accumulated in the fifteenth or twentieth preliminary stacker of the stage A. However, it is effective to assign a new accumulation place to the preliminary stacker which is as close as possible to the usual stacker incapable of accumulating the postal matters in order to improve handling efficiency.

[0031] Such preliminary stacker assigning rule can be arbitrarily set, and the assigning method is predetermined for each division designating area. It is to be noted that the preliminary stacker does not have to be necessarily assigned for each division designating area, and there may be a division designating area in which any preliminary stacker is not assigned.

[0032] FIG. 5 shows an example of a data table which stores information on the preliminary stacker assigning rule predetermined for each different division designating area. The division designating area is a postal matter delivery area such as the Kawasaki or Yokohama area, and managed by means of a pre-granted area number (hereinafter referred to as the area number) for each delivery area. It is to be noted that the data for each division designating area shown in FIG. 5 is stored in a memory (not shown) of the control unit 30. Every time the division designating area of the postal matter handled by the OVIS changes, the control unit 30 transmits the corresponding data to the conveyance and division control unit 35 to rewrite data contents of the memory circuit 46.

[0033] As to detailed data contents of this data table, the data table has: an area 51 to store the number n of the preliminary stackers assigned to the division designating area; an area 52 prepared for each preliminary stacker; an area 53 to store the stages A and B of the preliminary stacker; and an area 54 to store a stacker number of the preliminary stacker.

[0034] For example, assuming that the area number of the division designating area is m in a case where the postal matter to be delivered to the Kawasaki district is handled with the OVIS, the area number in a case where the postal matter to be delivered to the Yokohama district is handled is m+1 which is different from the area number m. It is to be noted that as to the information area 52 for each preliminary stacker, n areas are prepared as many as the preliminary stackers.

[0035] For reference, FIG. 6 shows an example of a data table which stores, for example, a preliminary stacker assigning rule in the Kawasaki district having the area number 5. It is to be noted that the data contents of this data table are matched with those of the preliminary stacker assigning example described with reference to FIG. 4.

[0036] There will be described hereinafter another data table stored in the memory circuit 46 of the conveyance and division control unit 35 with reference to FIGS. 7 to 10.

[0037] FIG. 7 shows a data table for storing use situations of all of the preliminary stackers assigned beforehand by the division accumulating section 10. This data table stores data received from the control unit 30, and data on the use situations of the preliminary stacker are stored. That is, this data table includes: an area 60 to store the total number of the preliminary stackers; an area 61 to store the number of the preliminary stackers for use, indicating the number of the preliminary stackers being used for tentative accumulation; and areas 62 assigned to all of the preliminary stackers. For example, assuming that the number of the preliminary stackers is n, and the number of the preliminary stackers for use is k, there results $n \geq k \geq 0$.

[0038] Each area 62 assigned to each preliminary stacker is constituted of: an area 621 for storing information on the preliminary stacker; and an area 622 for storing information on the usual stacker (full stacker) which designates the preliminary stacker as the temporary accumulation place.

[0039] The area 621 includes: an area 63 for storing the stage of the preliminary stacker; an area 64 for storing

stacker No.; and an area 65 to set a use situation flag for judging whether or not the preliminary stacker is used for the tentative accumulation. The use situation flag is set to "1" in a case where the preliminary stacker is already assigned for the tentative accumulation, and the flag is set to "0" in a case where the stacker is not used for the tentative accumulation.

[0040] The area 622 includes: an area 66 for storing the stage of the usual stacker which has designated the preliminary stacker as the temporary accumulation place; an area 67 for storing stacker No. of the usual stacker; and an area 68 to set a full-state cancellation flag for judging whether or not the full state of the usual stacker is cancelled. The full-state cancellation flag is set to "1" in a case where the usual stacker is filled, and the flag is set to "0" in a case where the full state is cancelled.

[0041] In addition, the usual stacker filled with the postal matters has been described above as the stacker incapable of accumulating, but, for example, the usual stacker (breakdown stacker) whose gate 29 has broken can be the stacker incapable of accumulating. That is, when the above-described full stacker is considered as the breakdown stacker, handling at a breakdown generation time is possible in the same manner as in a full-state generation time. That is, the full-state cancellation flag turns to a breakdown cancellation flag. The flag is set to "1" in a case where the gate breakdown is generated. When the gate breakdown is repaired, and a state capable of accumulating is achieved, "0" is set (details will be described later).

[0042] FIG. 8 shows a data table to temporarily store the information on the filled usual stacker in a case where any of the usual stackers is filled during the shifting of the postal matters. This data table has an area for temporarily storing full-state information. That is, the table has an area 70 for storing the stage of the filled usual stacker; and an area 71 for storing stacker No. of the usual stacker.

[0043] In a case where the data is written into these areas 70, 71, any data is not written in the area 622 present in the data table of FIG. 7. After assigning the preliminary stacker to the usual stacker, the information on the usual stacker is written into the areas 66, 67, and 68. Since a timing to write the information on the filled usual stacker into the areas 70 and 71 is different from a timing to write the information into the areas 66, 67, and 68, the areas 70 and 71 to temporarily store the full-state information are required.

[0044] FIG. 9 shows a data table having a plurality of areas for setting a flag indicating whether or not all of the stackers are full. All of the stackers mentioned herein include the stackers assigned to the preliminary stackers. At a time when the information on the filled usual stacker is written into the data area shown in FIG. 8, a flag indicating that the usual stacker is full is set to the area for the usual stacker. That is, "1" is set to the area of the filled usual stacker, and "0" is set to the area of the usual stacker whose full state has been cancelled. In the example shown in FIG. 9, the stacker A08 is brought into the full state, and the full state is cancelled in the stackers A01 to A07.

[0045] FIG. 10 shows a data table for storing the shift information of each postal matter during the shifting in the division accumulating section 10. This data table has: an area 75 for storing mail No. sequentially allocated to each postal matter; an area 76 to store a present code for specifying the present conveyance position of the postal matter in association with a shift sensor (not shown) through which the postal matter passes; and an area 77 for storing an accumulation place (destination) of the postal matter. The area 77 has an area 78 for storing the stage of the stacker which is an accumulation destination of the postal code, and an area 79 for storing the stacker No. of the stacker.

[0046] When the accumulation destination of the postal matter being shifted becomes incapable of accumulating, and the preliminary stacker is assigned as a new accumulation destination, the stacker No. as the accumulation destination of the postal matter is replaced with the number of the preliminary stacker (area 79). Thereafter, the postal matter is shifted to the preliminary stacker having the rewritten stacker No., the postal matter to be originally accumulated in the OVF can be accumulated in the preliminary stacker, and the postal matters to be accumulated in the OVF can be remarkably reduced.

[0047] There will be described hereinafter a postal matter handling operation by means of the OVIS structured as described above with reference to FIGS. 11 to 13. FIGS. 11 and 12 show flowcharts of the handling operation, and FIG. 13 shows a detailed flowchart of processing of step 10 of FIG. 11.

[0048] First, an operator inputs the area number m (see FIG. 5) of the division designating area matched with the postal matter to be supplied. According to this operation, the conveyance and division control unit 35 receives, from the control unit 30, the data present in the data table having the area number m described with reference to FIG. 5, and clears the data contents of the data table described with reference to FIG. 7. Thereafter, the received data is developed into the same data table (step 1). It is to be noted that the following processing is controlled by the conveyance and division control unit 35.

[0049] Next, it is checked whether or not the device is operating (step 2). When the device is not operating (step 2; NO), the processing ends. While the device is operating (step 2; YES), the conveyed postal matter is shifted (step 3). That is, in a case where the device is not operating, even when the usual stacker is filled, there is not any postal matter to be conveyed next, and therefore the processing ends.

[0050] In the shift processing of the step 3, each postal matter is conveyed and accumulated in accordance with a detection result of the shift sensor (not shown) based on the accumulation information of each postal matter described with reference to FIG. 10. In this case, the accumulation destination of each postal matter is stored in

the areas 78, 79 of the data table of FIG. 10.

[0051] After shifting each postal matter, it is checked whether or not the postal matter is to be accumulated in each stacker (step 4). When the matter is other than an accumulation object (step 4; NO), the processing shifts to that of step 19 described later. When the matter is the accumulation object (step 4; YES), the processing shifts to full-state check processing (step 5).

[0052] In the full-state checking in the step 5, states of the switches 27, 28 disposed in the stacker 20a are checked. When the stacker is not full (step 6; NO), normal accumulation is performed (step 7), and the processing shifts to that of step 19. When the full state is generated (step 6; YES), full-state generation processing is performed.

[0053] In the full-state generation processing, the full-state information is written in the data table described with reference to FIG. 8, and a full-state generation flag is set to the area of a full-state generated stacker in the data table described with reference to FIG. 9 (step 8). Thereafter, to inform the operator that the full state is generated, the full-state lamp 21 is blinked via the display section 20b of the stacker 20a (step 9).

[0054] Furthermore, thereafter the preliminary stacker is checked to confirm the state of the preliminary stacker to accumulate the postal matters which cannot be accumulated in the full stacker (step 10). This preliminary stacker check processing will be described later in detail with reference to a flowchart shown in FIG. 13.

[0055] Moreover, after the preliminary stacker check processing of the step 10, it is judged whether or not there exists a completely empty unused preliminary stacker or a preliminary stacker in which the postal matters are being accumulated (step 11). When there is not any usable preliminary stacker (step 11; NO), it is judged that there is not any stacker for tentative accumulation, and the postal matter to be accumulated in the full stacker is accumulated in the OVF (step 12).

[0056] On the other hand, when there exists the usable preliminary stacker (step 11; YES), the preliminary stacker is assigned to the accumulation destination to rewrite the information on the preliminary stacker (step 13).

[0057] When the preliminary stacker is unused, the information of the LCD 22 and the paper tag issuing switch 23 of the display section 20b of the preliminary stacker is rewritten into the same information as that of the full stacker. The information is already rewritten in the preliminary stacker in which the same type of postal matters are already accumulated. In this case, any processing is not performed (or the previously written information is again written).

[0058] Thereafter, to inform the operator that the preliminary stacker is being used, the paper tag lamp 23 of the preliminary stacker is turned on. Furthermore, to inform the operator of the presence of the usual stackers (full stackers) multi-connected to the preliminary stacker, the paper tag lamps 23 of the full stackers are turned on (step 14). Moreover, the postal matters are tentatively accumulated into the multi-connected preliminary stacker (step 15).

[0059] Next, there is performed the full-state cancellation processing of the full stacker switched to the preliminary stacker as described above. First, it is checked whether or not the full state of the full stacker has been canceled (step 16). The full-state cancellation is performed by turning on the paper tag issuing switch of the full stacker. As a result of the check of the step 16, when the full state is not cancelled (step 16; NO), the accumulation processing into the preliminary stacker is continued without performing anything. When the full state is cancelled (step 16; YES), the full-state lamp 21 of the full stacker is turned off, and the paper tag lamp 23 is also turned off (step 17).

[0060] When the full state of the full stacker is cancelled, the subsequently conveyed postal matter is conveyed and accumulated into the usual stacker whose full state has been cancelled instead of the preliminary stacker for use in the tentative accumulation. Therefore, the full-state lamp 21 and the paper tag lamp 23 of the preliminary stacker are blinked for the operator to remove the tentatively accumulated postal matters from the preliminary stacker (step 18). In this case, the only blinking of the paper tag lamp 23 is functionally sufficient, but the double blinking of the full-state lamp 21 and the paper tag lamp 23 can attract the operator's attention to remove the postal matters.

[0061] Moreover, it is checked whether or not the postal matters have been removed from the preliminary stacker (step 19). In this case, it is checked whether or not the blinked paper tag lamp 23 has been depressed. When the paper tag lamp 23 is not depressed (step 19; NO), it is judged that the tentatively accumulated postal matters are not removed to shift to device stop check of step 22 (step 22).

[0062] On the other hand, when the blinked paper tag issuing switch 23 has been depressed (step 10; YES), it is judged that the postal matters are removed from the preliminary stacker, the paper tag lamp 23 is turned off, and the full-state lamp 21 is turned off. Moreover, the paper tag indicating the same information as that of the full stacker is issued (step 20). Furthermore, to reuse the preliminary stacker, the LCD 22 and paper tag information of the display section 20b of the preliminary stacker are cleared (step 21).

[0063] Finally, the device stop check (step 22) is performed. When the device does not stop (step 22; NO), the processing returns to the shift processing of the step 3, and the processing loops until the device stops (step 22; YES). When the device stops (step 22; YES), the processing ends as such.

[0064] There will be described hereinafter the above-described preliminary stacker check processing of the step 10 with reference to FIG. 13.

[0065] In this case, first there is confirmed the number n of the preliminary stackers present in the area 60 of the data table described with reference to FIG. 7 (step

30). That is, it is checked whether or not the preliminary stacker is assigned to the division designating area of the postal matter which is the processing object. Moreover, in a case where there is no preliminary stacker (step 30; YES), since the postal matters cannot be tentatively accumulated, a flag is set which indicates that there is no preliminary stacker (step 39).

[0066] On the other hand, when there are preliminary stackers (step 30; NO), it is checked whether or not the preliminary stackers have already been assigned as multi-stackers for the full stacker (step 31). That is, it is checked whether or not the stage and the stacker No. stored in the areas 66 and 67 of the data table of FIG. 7 agree with those stored in the areas 70 and 71 of the data table of FIG. 8. If two pieces of information agree with each other (step 31; YES), it is judged that there is the preliminary stacker already assigned to the full stacker, and a flag is set which indicates that the same preliminary stacker exists (step 32).

[0067] On the other hand, in a case where any preliminary stacker is not assigned to the full stacker (step 31; NO), in order to newly assign the preliminary stacker to the full stacker, there is checked the number of the preliminary stackers for use, stored in the area 61 of FIG. 7 (step 34). When all of the preliminary stackers are being used (step 34; YES), it is judged that there is no preliminary stacker for the tentative accumulation, and a flag is set which indicates that there is no preliminary stacker (step 39).

[0068] In a case where none of the preliminary stackers are being used (step 34; NO), that is, there are usable preliminary stackers, it is checked whether or not there is any preliminary stacker in the same stage as that of the full stacker (step 35). When there is no preliminary stacker in the same stage (step 35; NO), it is judged that there is no preliminary stacker for the tentative accumulation, and a flag is set which indicates that there is not any preliminary stacker (step 39).

[0069] Furthermore, it is checked whether or not there is any usable preliminary stacker on the downstream side of the full stacker along the conveyance direction of the postal matters (step 36). That is, the stacker No. (full No.) 'of the full stacker is compared with the stacker No. (preliminary No.) of the preliminary stacker. As a result of this comparison, in a case where the preliminary No. is smaller than the full No., it is judged that there is no preliminary stacker on the downstream side of the full stacker (step 36; NO). Since the tentative accumulation is not possible, the flag is set which indicates that there is no preliminary stacker (step 39).

[0070] Moreover, as a result of the above-described comparison, in a case where the preliminary No. is larger than the full No., it is judged that the preliminary stacker exists on the downstream side of the full stacker in the same stage as that of the full stacker (step 36; YES), and the postal matters are accumulated in the preliminary stacker which is nearest to the full-state generation place. In this case, the information stored in the areas 63 and 64 of the data table of FIG. 7 is checked, the nearest preliminary stacker on the downstream side of the full stacker is judged, and the information of the full stacker is set in the areas 66 and 67 (step 37).

[0071] In this case, the full-state cancellation flag (area 68) of the full stacker is set to "1", and the use situation flag (area 65) of the corresponding preliminary stacker is also set to "1". Moreover, a flag is set which indicates that there is an empty preliminary stacker (step 38).

[0072] Thereafter, the stacker No. stored in the area 79 of the data table of FIG. 10 is rewritten (step 33). Accordingly, the tentative accumulation of the subsequently conveyed postal matters is possible.

[0073] There will be described hereinafter a typical example in which the full stacker is switched to the preliminary stacker with reference to FIGS. 14 to 17. Here, there will be described an example in which the preliminary stacker is assigned as in the preliminary stacker assigning example described with reference to FIG. 4, the eighth usual stacker (stacker A08) from the right of the stage A in the drawing (along the conveyance direction of the postal matter) turns to the full stacker, and the tenth preliminary stacker (stacker A10) from the right in the same stage is assigned to a new accumulation destination.

[0074] It is to be noted that an internal memory of the preliminary stacker A10 shown on the left side of each drawing indicates each area of the data table described with reference to FIG. 7. As a display example of the display section 20b shown on the right side of each drawing, there are shown the display sections 20b of the usual stacker A08 and the preliminary stacker A10. That is, FIGS. 14 to 17 show an image of a flow of processing.

[0075] As shown in FIG. 14, in an initial state in which the stacker A08 is not full, the stacker A10 is a preliminary stacker in which the tentative accumulation of the postal matter is not assigned. Therefore, all of the areas 66 to 68 are cleared ("0" is set) in which the information on the stacker A08 (full stacker) is stored, and the area 65 is also cleared ("0" is set) which indicates the use situation of the stacker A10 (preliminary stacker). That is, in this state, the following data is stored in each area of the data table.

[0076] Preliminary stacker 621: (stage 63) = 1 ... stage A

: (stacker No. 64) = 10 ... tenth

: (use situation flag 65) = 0 ... unused

[0077] Full stacker 622: (stage 66) = 0 ... full stacker is not yet determined

: (stacker No. 67) = 0 ... full stacker is not yet determined

: (full-state cancellation flag 68) = 0 ... initial state

[0078] As shown in FIG. 15, when the stacker A08 is filled, the full-state lamp 21 of the display section 20b of the stacker A08 blinks, and the LCD 22 of the display section 20b of the stacker A10 is rewritten into the same contents as those of the stacker A08. In this case, since the preliminary stacker is used, "1" is set to the use situation area 65 of the stacker A10. Moreover, the paper tag lamp 23 of the display section 20b of each stacker is

lit to display that the stackers A08 and A10 constitute the multi-stackers. The paper tag information of the stacker A10 is rewritten into the same information as that of the stacker A08 beforehand to prepare for a case where the paper tag issuing switch 23 of the display section 20b of the stacker A10 is depressed. That is, in this state, the following data is stored in each area of the data table.

[0079] Preliminary stacker 621: (stage 63) = 1 ... stage A
: (stacker No. 64) = 10 ... tenth
: (use situation flag 65) = 1 ... used

[0080] Full stacker 622: (stage 66) = 1 ... stage A is determined
: (stacker No. 67) = 8 ... eighth
: (full-state cancellation flag 68) = 1 ... full

[0081] As shown in FIG. 16, when the full state of the stacker A08 is cancelled, the full-state lamp of the display section 20b of the stacker A08 turns off, and the full-state cancellation flag of the area 68 is cleared in the data table in which the information on the stacker A10 is stored. Moreover, to inform that the stackers A08 and A10 are not multi-stackers, the paper tag lamp 23 of the stacker A08 is turned off, and the paper tag lamp 23 of the stacker A10 is blinked to remove the postal matters accumulated in the stacker A10. That is, in this state, the following data is stored in each area of the data table.

[0082] Preliminary stacker 621: (stage 63) = 1 ... stage A
: (stacker No. 64) = 10 ... tenth
: (use situation flag 65) = 1 ... used

[0083] Full stacker 622: (stage 66) = 1 ... stage A is determined
: (stacker No. 67) = 8 ... eighth
: (full-state cancellation flag 68) = 0 ... full state is cancelled

[0084] As shown in FIG. 17, when the paper tag issuing switch 23 present in the display section 20b of the stacker A10 is depressed, it is judged that the postal matters are removed from the stacker A10 to turn off the paper tag lamp 23. To inform that the stacker A10 is a completely empty preliminary stacker, display contents of the LCD 22 are cleared (in this case, "preliminary stacker" is displayed). Needless to say, the paper tag information is cleared. That is, in this state, the following data is stored in each area of the data table.

[0085] Preliminary stacker 621: (stage 63) = 1 ... stage A
: (stacker No. 64) = 10 ... tenth
: (use situation flag 65) = 0 ... unused

[0086] Full stacker 622: (stage 66) = 0 ... full stacker is not yet determined
: (stacker No. 67) = 0 ... full stacker is not yet determined
: (full-state cancellation flag 68) = 0 ... initial state

[0087] As described above, according to the present embodiment, when the usual stacker is filled, the postal matters to be accumulated in the usual stacker are tentatively accumulated in the preliminary stacker disposed between the usual stackers. Therefore, it is possible to greatly reduce the amount of the postal matters which cannot be accumulated and which are then accumulated in the OVF, a manual operation by the operator can be reduced, and an operation efficiency can be greatly improved.

[0088] Moreover, when the full state of the full stacker is cancelled, the tentative accumulation into the preliminary stacker is discontinued, and the postal matters can be accumulated in the original stacker. Therefore, many stackers do not have to be assigned as the same accumulation destination, and the stackers can be effectively used.

[0089] There will be described hereinafter a postal matter handling operation by means of the OVIS with reference to flowcharts shown in FIGS. 18 to 20. It is to be noted that here the handling operation will be described in a case where the gate 29 of the stacker 20a breaks during the handling of the postal matters. FIGS. 18 and 19 show flowcharts of the handling operation, and FIG. 20 shows a detailed flowchart of processing of step 48 of FIG. 18.

[0090] First, the operator inputs the area number m (see FIG. 5) of the division designating area matched with the postal matter to be supplied. According to this operation, the conveyance and division control unit 35 receives, from the control unit 30, the data present in the data table having the area number m described with reference to FIG. 5, and clears the data contents of the data table described with reference to FIG. 7. Thereafter, the received data is developed into the same data table (step 40). It is to be noted that the following processing is controlled by the conveyance and division control unit 35.

[0091] Next, it is checked whether or not the device is operating (step 41). When the device is not operating (step 41; NO), the processing ends. While the device is operating (step 41; YES), the conveyed postal matter is shifted (step 42). That is, in a case where the device is not operating, even when the gate 29 of the usual stacker breaks, there is not any postal matter to be conveyed next, and therefore the processing ends.

[0092] In the shift processing of the step 42, each postal matter is conveyed and accumulated in accordance with a detection result of the shift sensor (not shown) based on the accumulation information of each postal matter described with reference to FIG. 10. In this case, the accumulation destination of each postal matter is stored in the areas 78 and 79 of the data table of FIG. 10.

[0093] After shifting each postal matter, it is checked whether or not the postal matter is to be accumulated in each stacker (step 43). When the matter is other than an accumulation object (step 43; NO), the processing shifts to that of step 57 described later to initialize the preliminary stacker. When the matter is the accumulation object (step 43; YES), the gate 29 of the corresponding stacker 20a is operated (step 44), and the processing shifts to an accumulating operation.

[0094] Moreover, after switching the gate 29 in the step 44, it is checked whether or not the postal matter is con-

veyed by the shift sensor on the downstream side of the gate 29 (step 45). As a result of this check, unless the postal matter is detected with the shift sensor on the downstream side, it is judged that the matter is normally accumulated (step 46) in the stacker, thereby shifting to processing of step 57. On the other hand, when the postal matter is conveyed to the shift sensor on the downstream side (step 45; NO), it is judged that a gate distribution mistake is made owing to the breakdown of the gate 29, thereby setting a flag (step 47).

[0095] Next, the preliminary stacker is checked to confirm the state of the preliminary stacker to accumulate the postal matters which cannot be accumulated because the gate 29 breaks (step 48). This preliminary stacker check processing will be described later in detail with reference to a flowchart shown in FIG. 20.

[0096] Moreover, after the preliminary stacker check processing of the step 48, it is judged whether or not there exists a completely empty unused preliminary stacker or a preliminary stacker in which the postal matters are being accumulated (step 49). When there is no usable preliminary stacker (step 49; NO), it is judged that there is no stacker for the tentative accumulation, and the postal matter to be accumulated in the breakdown stacker is accumulated in the OVF (step 50).

[0097] On the other hand, when there exists the usable preliminary stacker (step 49; YES), the preliminary stacker is assigned to the accumulation destination to rewrite the information on the preliminary stacker (step 51).

[0098] When the preliminary stacker is unused, the information of the LCD 22 and the paper tag issuing switch 23 of the display section 20b of the preliminary stacker is rewritten into the same information as that of the breakdown stacker. The information is already rewritten in the preliminary stacker in which the same type of postal matters are already accumulated. In this case, any processing is not performed (or the previously written information is again written).

[0099] Thereafter, to inform the operator that the preliminary stacker is being used, the paper tag lamp 23 of the preliminary stacker is turned on. Furthermore, to inform the operator of presence of the usual stackers (breakdown stackers) multi-connected to the preliminary stacker, the paper tag lamps 23 of the breakdown stackers are turned on (step 52). Moreover, the postal matters are tentatively accumulated into the multi-connected preliminary stacker (step 53).

[0100] Next, there is performed the breakdown cancellation processing of the breakdown stacker switched to the preliminary stacker as described above. First, it is checked whether or not the gate 29 of the breakdown stacker has been repaired (step 54). When the stacker is not repaired (step 54; NO), the processing shifts to that of step 57. When the stacker is repaired (step 54; YES), the paper tag lamp 23 of the breakdown stacker is turned off (step 55).

[0101] When the gate 29 of the breakdown stacker becomes operative, the subsequently conveyed postal matter is conveyed and accumulated into the usual stacker whose breakdown has been cancelled instead of the preliminary stacker for use in the tentative accumulation. Therefore, the full-state lamp 21 and the paper tag lamp 23 of the preliminary stacker are blinked for the operator to remove the tentatively accumulated postal matters from the preliminary stacker (step 56). In this case, the only blinking of the paper tag lamp 23 is functionally sufficient, but the double blinking of the full-state lamp 21 and the paper tag lamp 23 can attract the operator's attention to remove the postal matters.

[0102] Moreover, it is checked whether or not the postal matters have been removed from the preliminary stacker (step 57). In this case, it is checked whether or not the blinked paper tag lamp 23 has been depressed. When the paper tag lamp 23 is not depressed (step 57; NO), it is judged that the tentatively accumulated postal matters are not removed to shift to device stop check of step 60 (step 60).

[0103] On the other hand, when the blinked paper tag issuing switch 23 has been depressed (step 57; YES), it is judged that the postal matters are removed from the preliminary stacker, the full-state lamp 21 and the paper tag lamp 23 are turned off, and the paper tag indicating the same information as that of the breakdown stacker is issued (step 58). Furthermore, to reuse the preliminary stacker, the LCD 22 and paper tag information of the display section 20b of the preliminary stacker are cleared (step 59).

[0104] Finally, the device stop check (step 60) is performed. When the device does not stop (step 60; NO), the processing returns to the shift processing of the step 42, and the processing loops until the device stops (step 60; YES). When the device stops (step 60; YES), the processing ends as such.

[0105] There will be described hereinafter the above-described preliminary stacker check processing of the step 48 with reference to FIG. 20. Here, the full stacker described with reference to FIG. 7 is replaced with the breakdown stacker, and the full-state information is replaced with the breakdown information. The full-state temporary storage area described with reference to FIG. 8 is replaced with a breakdown information temporary storage area. According to this replacement, even if the unusable stacker is generated owing to the breakdown of the gate 29, processing can be performed using the preliminary stacker in the same manner as in the above-described processing in the full state. The stacker check processing will be described hereinafter.

[0106] First there is confirmed the number n of the preliminary stackers present in the area 60 of the data table described with reference to FIG. 7 (step 70). That is, it is checked whether or not the preliminary stacker is assigned to the division designating area of the postal matter which is the processing object. Moreover, in a case where there is not any preliminary stacker (step 70; YES), since the postal matters cannot be tentatively accumulated, a flag is set which indicates that there is not any

preliminary stacker (step 79).

[0107] On the other hand, when there are preliminary stackers (step 70; NO), it is checked whether or not the preliminary stackers have already been assigned as multi-stackers for the breakdown stacker (step 71). That is, it is checked whether or not the stage and the stacker No. stored in the areas 66 and 67 of the data table of FIG. 7 agree with those stored in the areas 70 and 71 of the data table of FIG. 8. If two pieces of information agree with each other (step 71; YES), it is judged that there is the preliminary stacker already assigned to the breakdown stacker, and a flag is set which indicates that the same preliminary stacker exists (step 72).

[0108] On the other hand, in a case where any preliminary stacker is not assigned to the breakdown stacker (step 71; NO), in order to newly assign the preliminary stacker to the breakdown stacker, there is checked the number of the preliminary stackers for use, stored in the area 61 of FIG. 7 (step 74). When all of the preliminary stackers are being used (step 74; YES), it is judged that there is no preliminary stacker for the tentative accumulation, and a flag is set which indicates that there is no preliminary stacker (step 79).

[0109] In a case where all of the preliminary stackers are not being used (step 74; NO), that is, there are usable preliminary stackers, it is checked whether or not there is any preliminary stacker in the same stage as that of the breakdown stacker (step 75). When there is no preliminary stacker in the same stage (step 75; NO), it is judged that there is no preliminary stacker for the tentative accumulation, and a flag is set-which indicates that there is no preliminary stacker (step 79) .

[0110] Furthermore, it is checked whether or not there is any usable preliminary stacker on the downstream side of the breakdown stacker along the conveyance direction of the postal matters (step 76). That is, the stacker No. (breakdown No.) of the breakdown stacker is compared with the stacker No. (preliminary No.) of the preliminary stacker. As a result of this comparison, in a case where the preliminary No. is smaller than the breakdown No., it is judged that there is no preliminary stacker on the downstream side of the breakdown stacker (step 76; NO). Since the tentative accumulation is not possible, the flag is set which indicates that there is no preliminary stacker (step 79).

[0111] Moreover, as a result of the above-described comparison, in a case where the preliminary No. is larger than the breakdown No., it is judged that the preliminary stacker exists on the downstream side of the breakdown stacker in the same stage as that of the breakdown stacker (step 76; YES), and the postal matters are accumulated in the preliminary stacker which is nearest to the breakdown generation place. In this case, the information stored in the areas 63 and 64 of the data table of FIG. 7 is checked, the nearest preliminary stacker on the downstream side of the breakdown stacker is judged, and the information of the breakdown stacker is set in the areas 66 and 67 (step 77).

[0112] In this case, the breakdown cancellation flag of the breakdown stacker is set to "1", and the use situation flag of the preliminary stacker is also set to "1" (step 77). Moreover, a flag is set which indicates that there is an empty preliminary stacker (step 78).

[0113] Thereafter, the stacker No. stored in the area 79 of the data table of FIG. 10 is rewritten (step 33). Accordingly, the tentative accumulation of the subsequently conveyed postal matters is possible.

[0114] As described above, even in the present embodiment, it is possible to greatly reduce the amount of the postal matters accumulated in the OVF owing to the breakdown of the stacker and improve a handling efficiency in the same manner as in the above-described full-state cancellation processing.

[0115] It is to be noted that the present invention is not limited to the above-described embodiment as such, and can be embodied by deforming constituting elements without departing from the scope in an implementation stage. Various types of invention can be formed by appropriately combining a plurality of constituting elements disclosed in the above-described mode for carrying out the invention. For example, several constituting elements may be deleted from all of the constituting elements described above in the mode for carrying out the invention. Furthermore, the constituting elements of different embodiments may be appropriately combined.

[0116] For example, in the above-described embodiment, there has been described the processing to tentatively accumulate the postal matters in the preliminary stacker in a case where the usual stacker is filled and the gate 29 of the stacker breaks. However, the present invention is not limited to this embodiment, and the present invention is applicable to a case where the postal matters cannot be accumulated in the usual stacker owing to another factor.

[0117] Moreover, in the usual processing by the above-described OVIS, both the full stacker and the breakdown stacker are generated in some case. Even in this case, the stackers are incapable of accumulating the postal matters, and can be similarly handled using the preliminary stacker disposed between the usual stackers as described above.

Industrial Applicability

[0118] According to the present invention, preliminary stackers are not fixed as multi-stackers for a specific usual stacker, and they are arbitrarily and automatically multi-connected to a plurality of usual stackers, and used. Therefore, it is possible to reduce an amount of postal matters accumulated in an OVF when the usual stacker is filled or breaks. In consequence, it is possible to greatly reduce troublesome re-handlings of the postal matters accumulated in the OVF and improve operation efficiency.

Claims

1. A paper sheet handling device **characterized by** comprising:

   a plurality of accumulating sections arranged along a conveyance direction of paper sheets;
   a detecting section which detects incapability to accumulate the paper sheets into the accumulating sections;
   preliminary accumulating sections disposed between the plurality of accumulating sections; and
   a control section which accumulates the paper sheets to be accumulated in the accumulating sections into the nearest preliminary accumulating section on a downstream side of the accumulating section along the conveyance direction, when the detecting section detects the incapability to accumulate the paper sheets.

2. The paper sheet handling device according to claim 1, **characterized in that** the control section accumulates the paper sheets to be accumulated in the accumulating section into another preliminary accumulating section in a case where the nearest preliminary accumulating section is already used as the preliminary accumulating section for another accumulating section.

3. The paper sheet handling device according to claim 1 or 2, **characterized in that** the control section discontinues tentative accumulation into the preliminary accumulating section, and resumes accumulation of the paper sheets into the accumulating section, when an accumulation impossible state of the accumulating section incapable of accumulating is cancelled.

4. The paper sheet handling device according to claim 3, **characterized by** further comprising:

   display sections which are disposed for the respective accumulating sections and which notify the incapability to accumulate the paper sheets in the accumulating sections to prompt cancellation of the accumulation impossible state.

5. The paper sheet handling device according to claim 1, **characterized in that** the detecting section detects that the accumulating section is filled with the paper sheets.

6. The paper sheet handling device according to claim 5, **characterized in that** the control section discontinues tentative accumulation into the preliminary accumulating section, and resumes accumulation of the paper sheets into the accumulating section, when a full state of the filled accumulating section is cancelled.

7. The paper sheet handling device according to claim 1, **characterized in that** the detecting section detects that a gate to direct the paper sheets to the accumulating section breaks.

8. The paper sheet handling device according to claim 7, **characterized in that** the control section discontinues tentative accumulation into the preliminary accumulating section, and resumes accumulation of the paper sheets into the accumulating section, when the gate that has broken becomes usable.

9. A paper sheet handling device **characterized by** comprising:

   readout means for reading images of paper sheets;
   recognition means for recognizing division information constituted of a postal code or an address described in the read image read by this readout means;
   a sorting section having a stacker including a plurality of usual and preliminary stackers for sorting and accumulating the paper sheets based on a result of recognition of the division information by this recognition means, and a stacker display section which displays states of the paper sheets accumulated in the stacker;
   detection means disposed in this sorting section to detect an amount of the paper sheets accumulated in the stacker;
   full-state generation processing means for handling the paper sheets, when the detection means detects that the paper sheets accumulated in the usual stackers reach a predetermined amount;
   preliminary stacker checking means for detecting the state of the preliminary stacker;
   first preliminary stacker accumulation means for switching the usual stacker to the preliminary stacker to accumulate the paper sheets continuously conveyed to the usual stacker in the preliminary stacker based on a result of the full-state generation processing means, when vacancy of the preliminary stacker is detected based on the judgment result of the preliminary stacker checking means;
   full-state cancellation means for resetting the usual stacker, when the paper sheets accumulated in the usual stacker are removed in response to the display of the stacker display section; and
   second preliminary stacker accumulation means for switching the preliminary stacker to the usual stacker to accumulate the paper

sheets continuously conveyed to the preliminary stacker in the usual stacker as a result of cancellation, thereby resetting the preliminary stacker.

10. A paper sheet handling device **characterized by** comprising:

readout means for reading images of paper sheets;
recognition means for recognizing division information constituted of a postal code or an address described in the read image read by this readout means;
a sorting section having a stacker including a plurality of usual and preliminary stackers for sorting and accumulating the paper sheets based on a result of recognition of the division information by this recognition means, and a stacker display section which displays states of the paper sheets accumulated in the stacker;
breakdown processing means for detecting breakdown of the usual stacker from conveyed states of the paper sheets accumulated by the sorting section;
preliminary stacker checking means for detecting the state of the preliminary stacker;
first preliminary stacker accumulation means for switching the usual stacker to the preliminary stacker to accumulate the paper sheets continuously conveyed to the usual stacker in the preliminary stacker based on a result of the breakdown processing means, when vacancy of the preliminary stacker is detected based on the judgment result of the preliminary stacker checking means;
breakdown cancellation means for resetting the usual stacker, when the paper sheets accumulated in the usual stacker are removed in response to the display of the stacker display section; and
second preliminary stacker accumulation means for switching the preliminary stacker to the usual stacker to accumulate the paper sheets continuously conveyed to the preliminary stacker in the usual stacker as a result of breakdown cancellation, thereby resetting the preliminary stacker.

11. The paper sheet handling device according to claim 9 or 10, **characterized in that** the sorting section comprises:

the stacker having:

a sorting accumulation gate which is disposed in an inlet of the stacker and which rotates in taking the conveyed paper sheets into the stacker,
a backup plate which accumulates the paper sheets taken in by this sorting accumulation gate, and
the detection means for detecting the amount of the paper sheets accumulated in this backup plate; and

stacker display means having:

first display means for displaying that the paper sheets accumulated in this stacker reach a predetermined amount and second display means for displaying division of the paper sheets accumulated in the stacker, and
an illuminative light paper tag issuing switch to issue a paper tag on which the division is printed, when the accumulated paper sheets are removed from the stacker.

12. The paper sheet handling device according to claim 11, **characterized in that** the first display means blinks a full-state lamp, when the stacker is filled with the accumulated paper sheets,
the second display means displays the division of the paper sheets accumulated in the stacker in an LCD display unit,
the illuminative light type paper tag issuing switch has a paper tag lamp and a paper tag switch, the paper tag lamp is displayed to prompt an operator to issue the paper tag, and the paper tag switch is depressed by the operator, when the paper sheets are removed from the stacker and the paper tag is issued.

13. The paper sheet handling device according to claim 9, **characterized in that** the full-state generation processing means stores, in a full-state generation situation area, a position corresponding to the stacker in which a full state is generated, and blinks the full-state lamp, when the usual stacker is filled with the paper sheets.

14. The paper sheet handling device according to claim 9 or 10, **characterized in that** the preliminary stacker checking means comprises:

preliminary stacker number confirmation means for confirming the number of the preliminary stackers;
assignment confirmation means for indicating that there is no preliminary stacker in a case where there is no preliminary stacker as a result of confirmation by the preliminary stacker number confirmation means and for checking whether or not the preliminary stacker is already assigned in a case where the preliminary stacker

exists as a result of the confirmation by this preliminary stacker number confirmation means;
all preliminary stacker use confirmation means for indicating that the same preliminary stacker exists in a case where the preliminary stacker is already assigned as a result of confirmation by the assignment confirmation means and for checking whether or not all of the preliminary stackers are used in a case where no preliminary stacker is assigned as a result of the confirmation by this assignment confirmation means;
stage spare confirmation means for indicating that there is no preliminary stacker in a case where all of the preliminary stackers are used as a result of confirmation by this all preliminary stacker use confirmation means and for checking whether or not the preliminary stacker exists in the stage in which the usual stacker is disposed in a case where none of the preliminary stackers are used; and
conveyance downstream spare confirmation means for indicating that there is no preliminary stacker in a case where there is not any preliminary stacker in the corresponding stage as a result of confirmation by this stage spare confirmation means and for checking whether or not the preliminary stacker exists on the downstream side of the usual stacker in a conveyance direction in a case where the preliminary stacker exists in the stage, and
as a result of the confirmation by the conveyance downstream, it is indicated that there is no preliminary stacker in a case where there is no preliminary stacker, and it is indicated that there is an empty preliminary stacker in a case where the preliminary stacker exists on the downstream side of the conveyance direction.

15. The paper sheet handling device according to claim 9 or 10, **characterized in that** the first preliminary stacker accumulation means comprises:

preliminary stacker information rewriting means for rewriting preliminary stacker information into full stacker information to multi-connect the full stacker to the preliminary stacker in a case where the preliminary stacker checking means indicates that the same preliminary stacker exists or the empty preliminary stacker exists, and the first preliminary stacker accumulation means turns on a paper tag lamp of the full stacker, turns on a paper tag lamp of the preliminary stacker, switches destination stacker information to accumulate the paper sheets from the full stacker to the paper sheets, and accumulates the paper sheets continuously conveyed to the preliminary stacker.

16. The paper sheet handling device according to claim 9, **characterized in that** the full-state cancellation means turns off a full-state lamp and a paper tag lamp of the full stacker, and blinks a paper tag lamp of the preliminary stacker multi-connected to the full stacker, when the paper sheets accumulated in the full stacker are removed by an operator and an illuminative light type paper tag switch of the full stacker is depressed.

17. The paper sheet handling device according to claim 9 or 10, **characterized in that** the second preliminary stacker accumulation means comprises:

means for turning off a paper tag lamp of the preliminary stacker and issuing a paper tag, when the paper sheets accumulated in the preliminary stacker multi-connected to the full stacker are removed by an operator and an illuminative light type paper tag switch of the preliminary stacker is depressed; and
preliminary stacker information rewriting means for clearing preliminary stacker information to reset an initial state.

18. The paper sheet handling device according to claim 10, **characterized in that** the breakdown processing means comprises:

a shift sensor which detects a conveyance position of the paper sheet; and
a shift information area which stores the conveyance position and a destination stacker of the paper sheet detected by the shift sensor, and it is judged that a sorting accumulation gate breaks, when the paper sheets are not accumulated in the destination stacker, and the shift sensor on the downstream side of a conveyance direction detects the paper sheets in a case where the sorting accumulation gate of the stacker rotates to take the paper sheets into the destination stacker indicated by the shift information area.

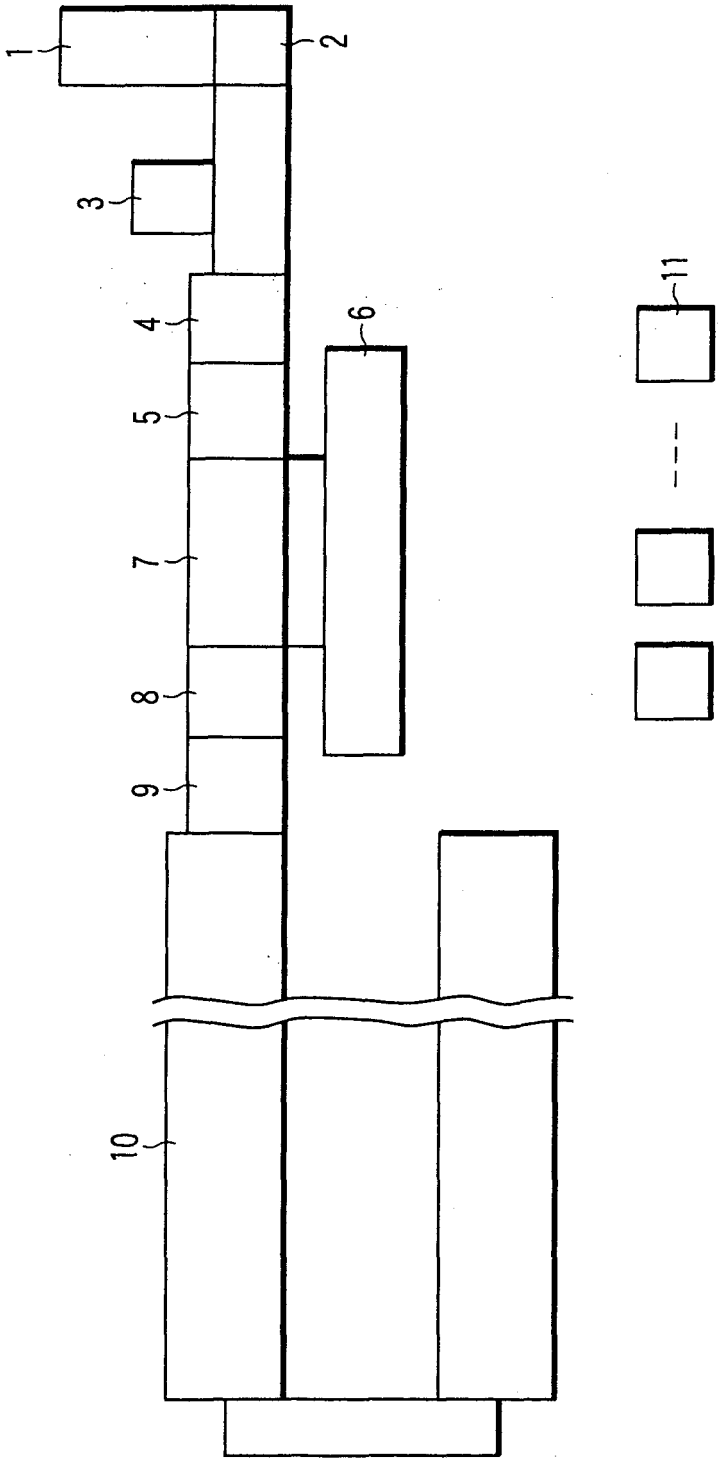

FIG. 1

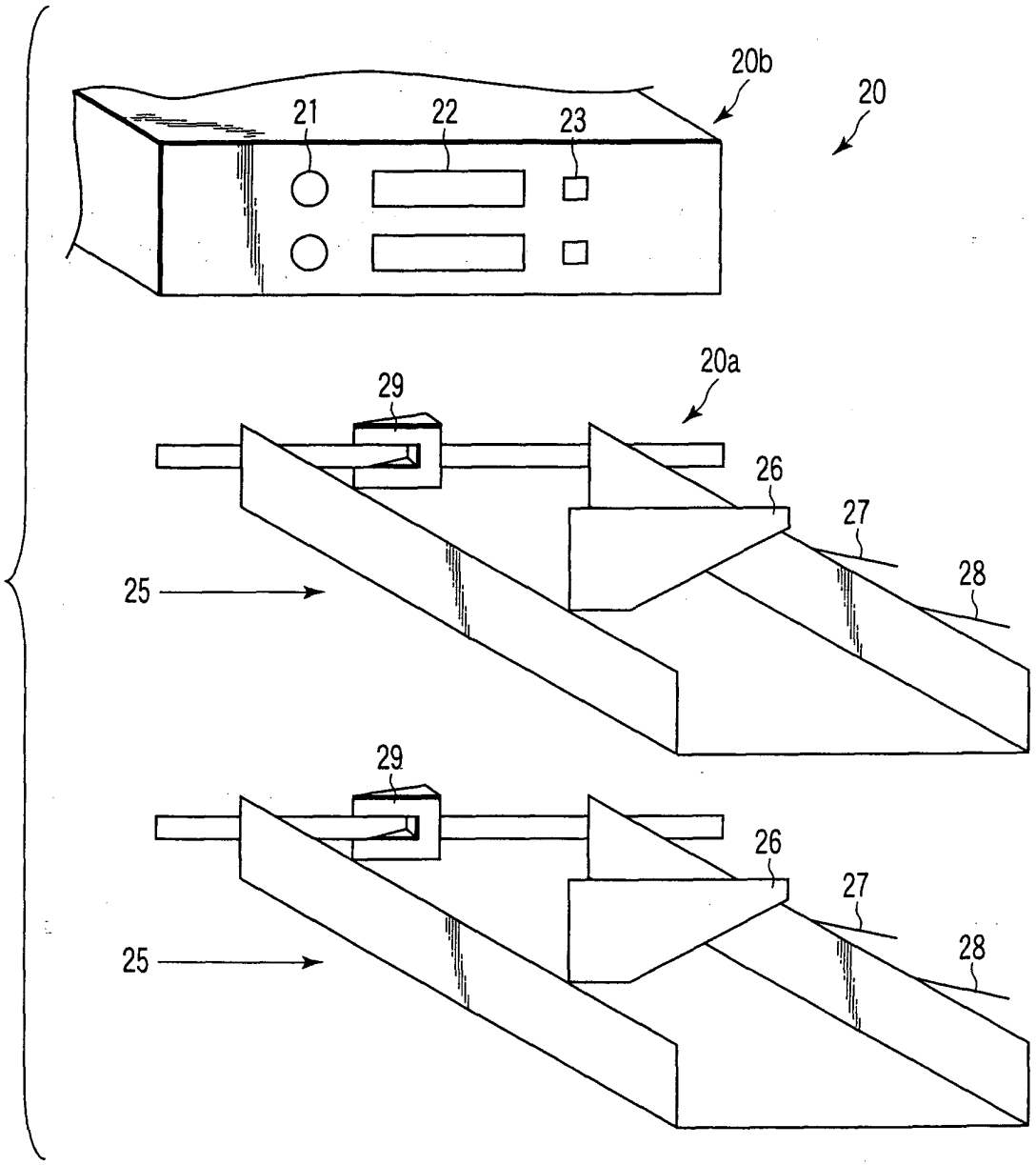

FIG. 2

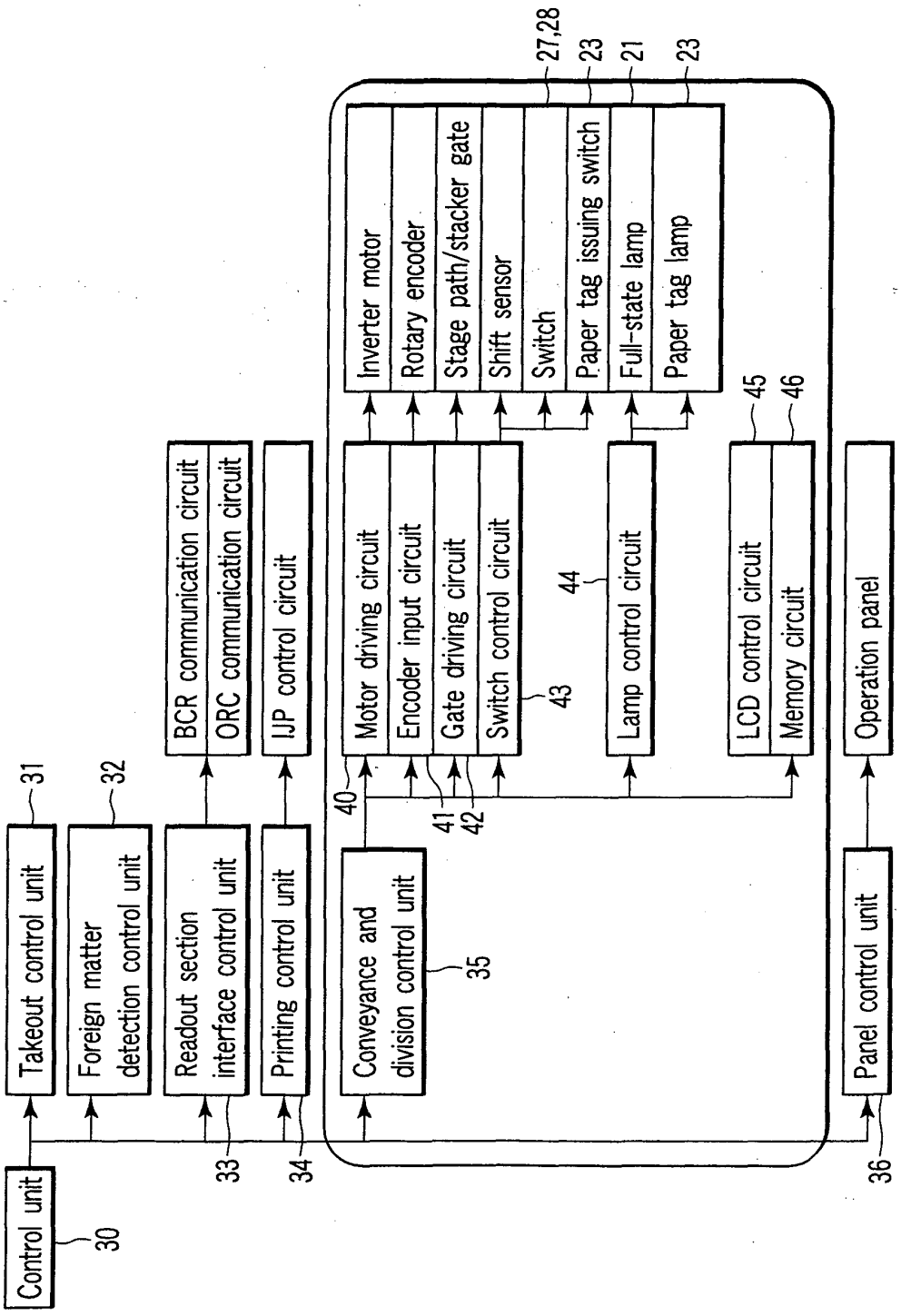
Control unit
30
Takeout control unit
31
Foreign matter detection control unit
32
Readout section interface control unit
Printing control unit
BCR communication circuit
ORC communication circuit
IJP control unit
33
34
Conveyance and division control unit
35
Motor driving circuit
Encoder input circuit
Gate driving circuit
Switch control circuit
40
41
42
43
44
Lamp control circuit
LCD control circuit
Memory circuit
45
46
Panel control unit
Operation panel
36
Inverter motor
Rotary encoder
Stage path/stacker gate
Shift sensor
Switch
Paper tag issuing switch
Full-state lamp
Paper tag lamp
27,28
23
21
23

FIG. 3

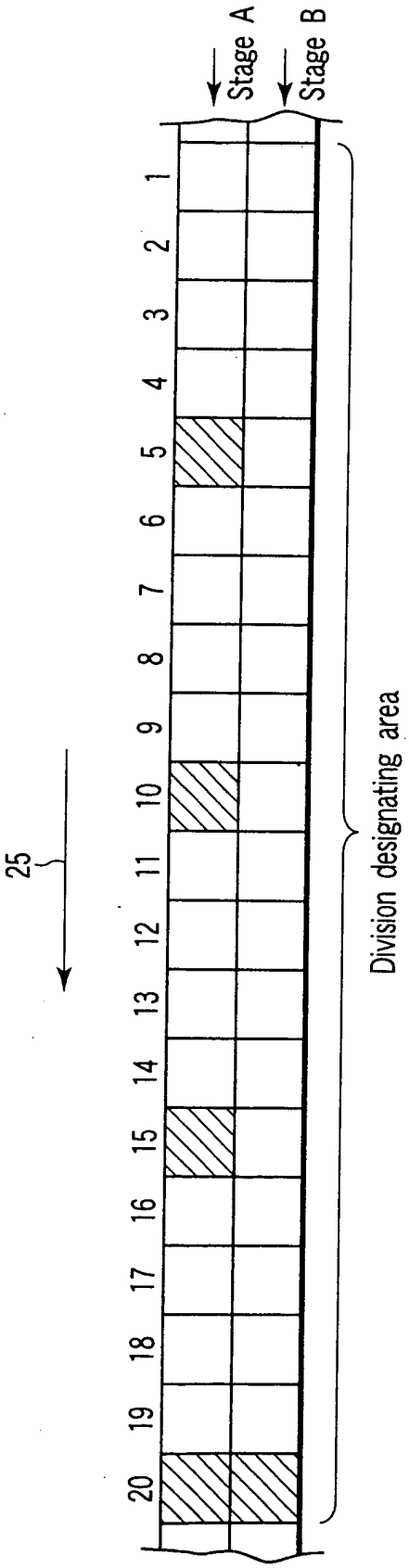
Stage A
Stage B
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
25
Division designating area

FIG. 4

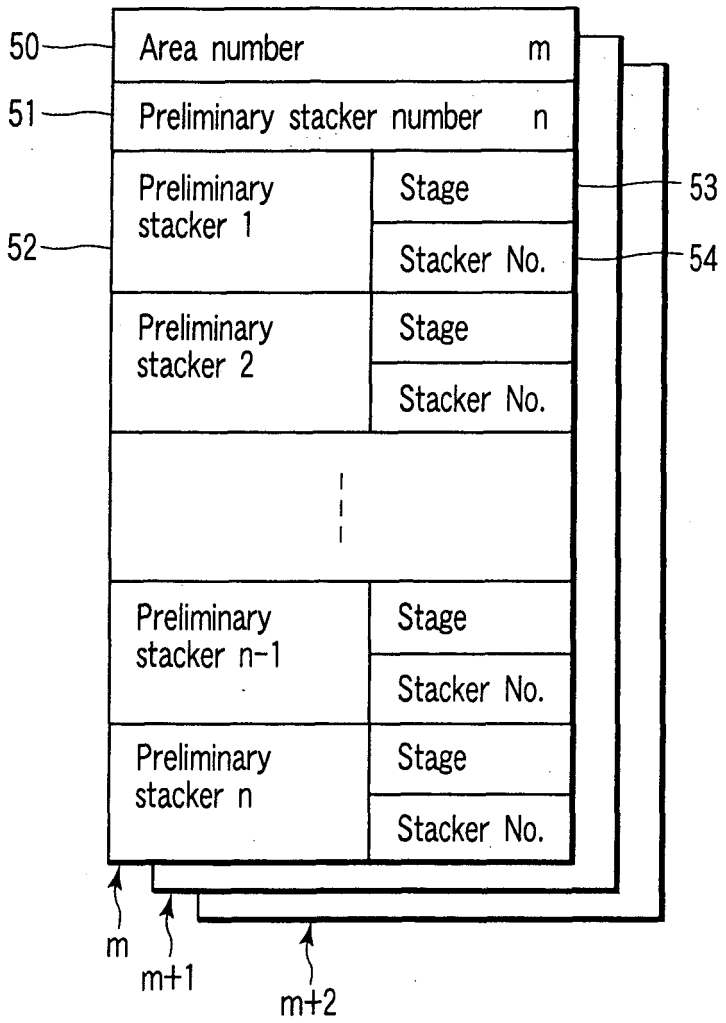
50
Area number m
51
Preliminary stacker number n
52
Preliminary stacker 1
Stage
Stacker No.
53
54
Preliminary stacker 2
Stage
Stacker No.
Preliminary stacker n-1
Stage
Stacker No.
Preliminary stacker n
Stage
Stacker No.
m
m+1
m+2

FIG. 5

Area 5 (Kawasaki district)	
5 preliminary stackers	
Preliminary stacker 1	Stage A
	No. 5
Preliminary stacker 2	Stage A
	No. 10
Preliminary stacker 3	Stage A
	No. 15
Preliminary stacker 4	Stage A
	No. 20
Preliminary stacker 5	Stage B
	No. 20

FIG. 6

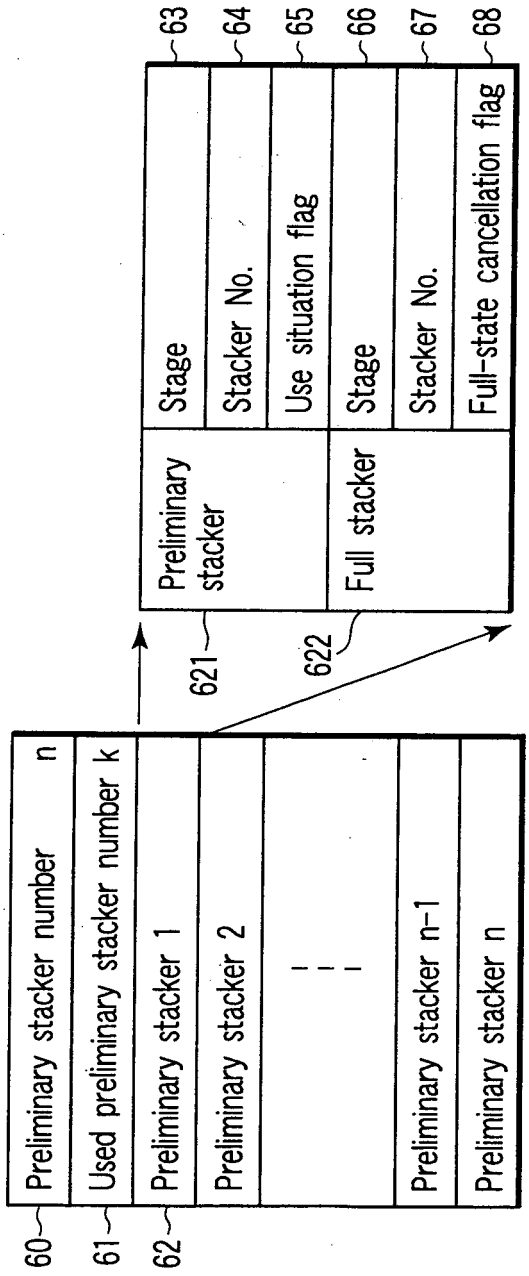
Preliminary stacker number n
Used preliminary stacker number k
Preliminary stacker 1
Preliminary stacker 2
Preliminary stacker n-1
Preliminary stacker n
(n≧0,n≧k≧0)
60
61
62
621
622
63
64
65
66
67
68
Preliminary stacker
Full stacker
Stage
Stacker No.
Use situation flag
Stage
Stacker No.
Full-state cancellation flag

FIG. 7

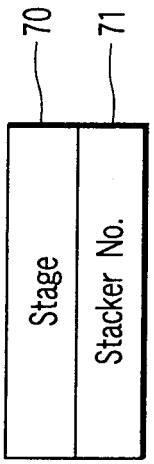
70
71
Stage
Stacker No.

FIG. 8

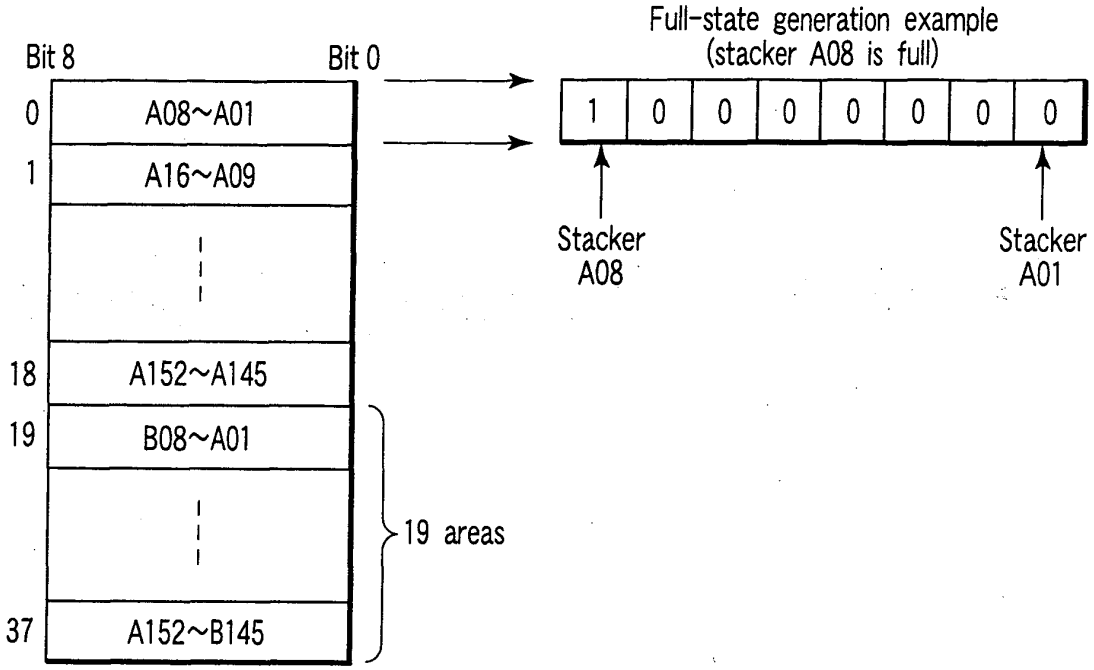
Full-state generation example
(stacker A08 is full)
Bit 8
Bit 0
0
A08~A01
1
A16~A09
18
A152~A145
19
B08~A01
37
A152~B145
19 areas
1 0 0 0 0 0 0 0
Stacker A08
Stacker A01

FIG. 9

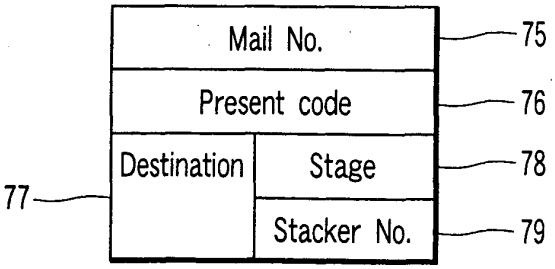
Mail No.
75
Present code
76
Destination
Stage
78
77
Stacker No.
79

FIG. 10

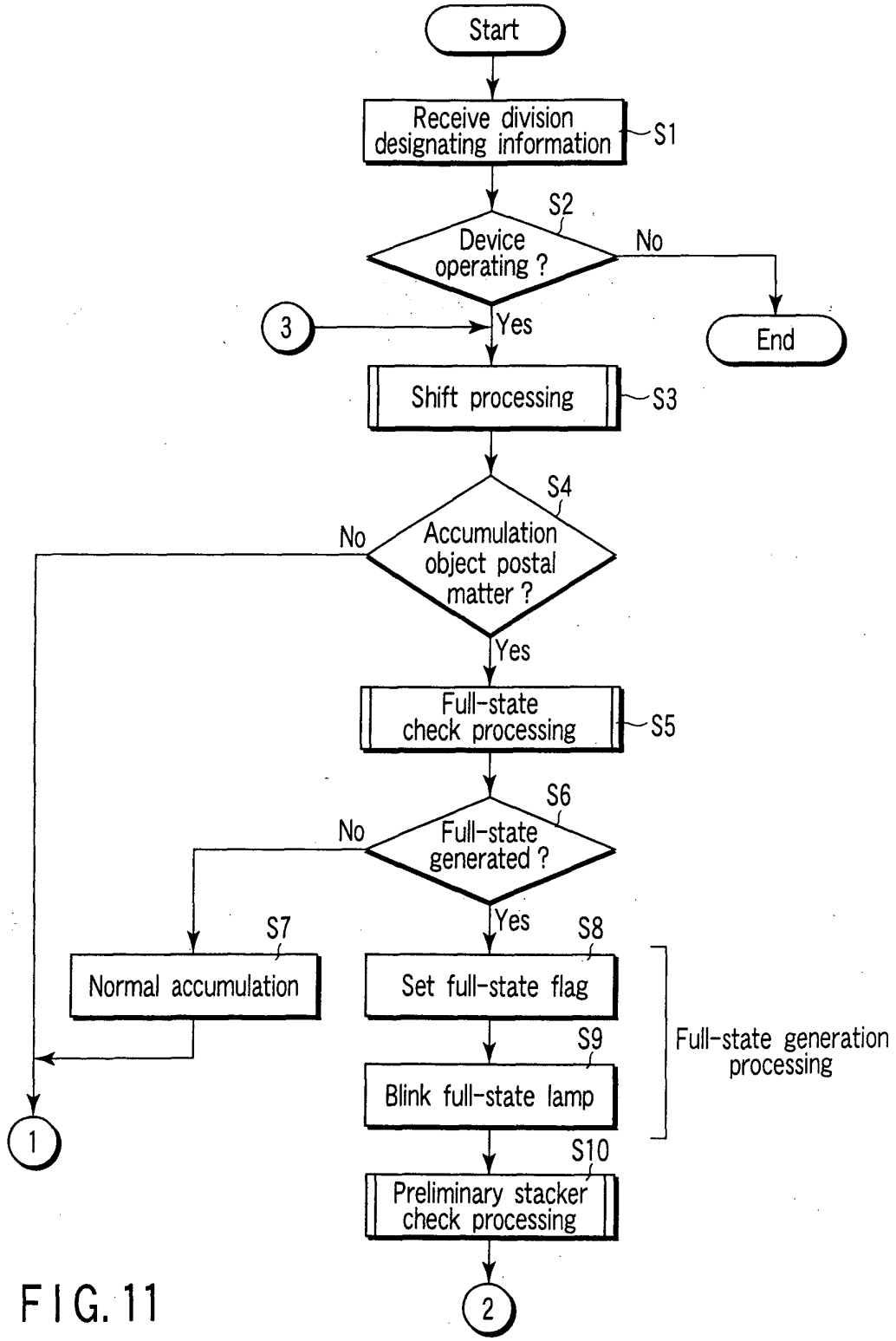
Start
Receive division designating information
S1
S2
Device operating ?
No
End
3
Yes
Shift processing
S3
S4
No
Accumulation object postal matter ?
Yes
Full-state check processing
S5
S6
No
Full-state generated ?
Yes
S7
S8
Normal accumulation
Set full-state flag
S9
Blink full-state lamp
Full-state generation processing
S10
Preliminary stacker check processing
1
2

FIG. 11

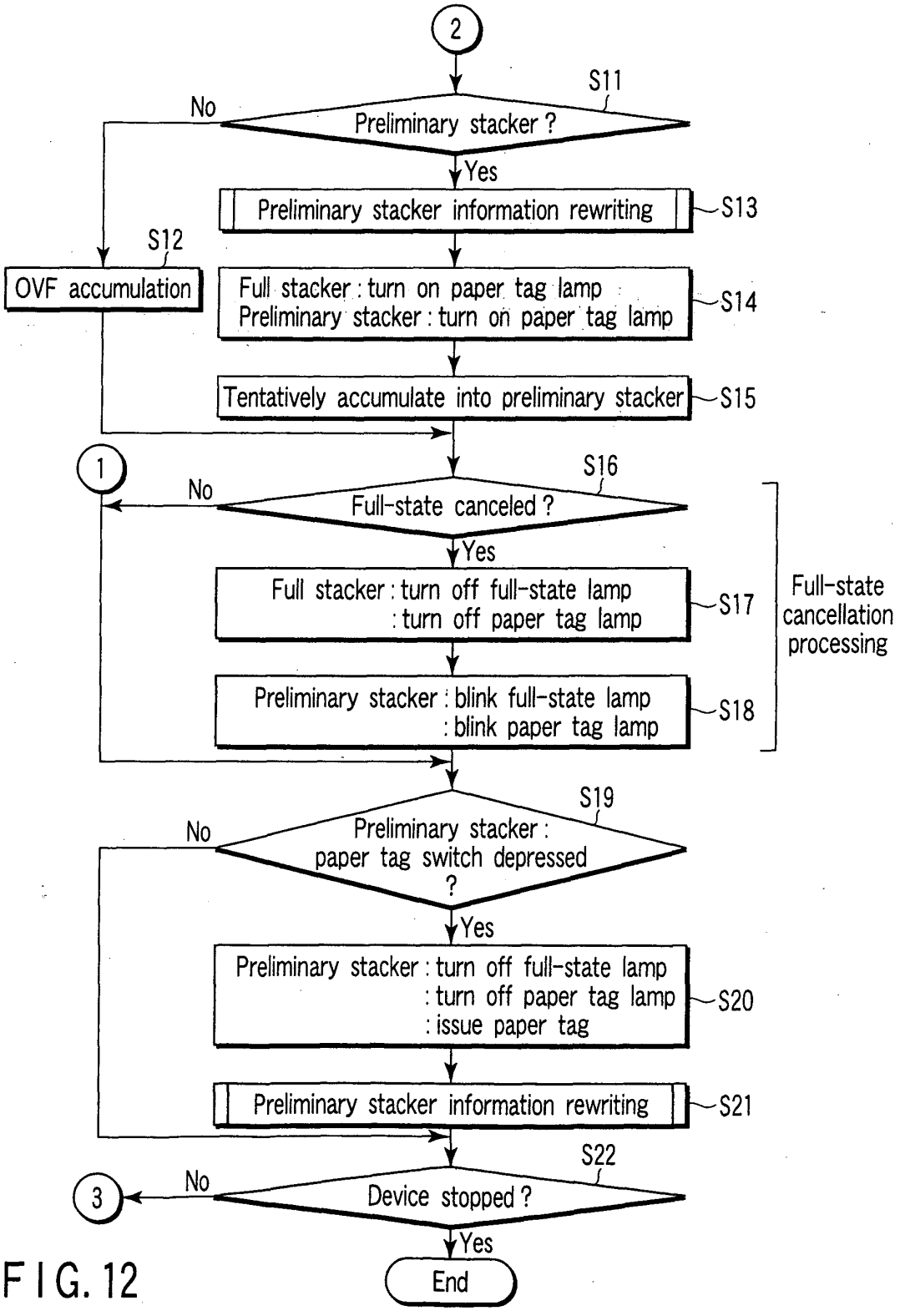
2
S11
No
Preliminary stacker ?
Yes
Preliminary stacker information rewriting
S13
S12
OVF accumulation
Full stacker : turn on paper tag lamp
Preliminary stacker : turn on paper tag lamp
S14
Tentatively accumulate into preliminary stacker
S15
1
S16
No
Full-state canceled ?
Yes
Full stacker : turn off full-state lamp
: turn off paper tag lamp
S17
Preliminary stacker : blink full-state lamp
: blink paper tag lamp
S18
Full-state cancellation processing
S19
No
Preliminary stacker : paper tag switch depressed ?
Yes
Preliminary stacker : turn off full-state lamp
: turn off paper tag lamp
: issue paper tag
S20
Preliminary stacker information rewriting
S21
S22
3
No
Device stopped ?
Yes
End

FIG. 12

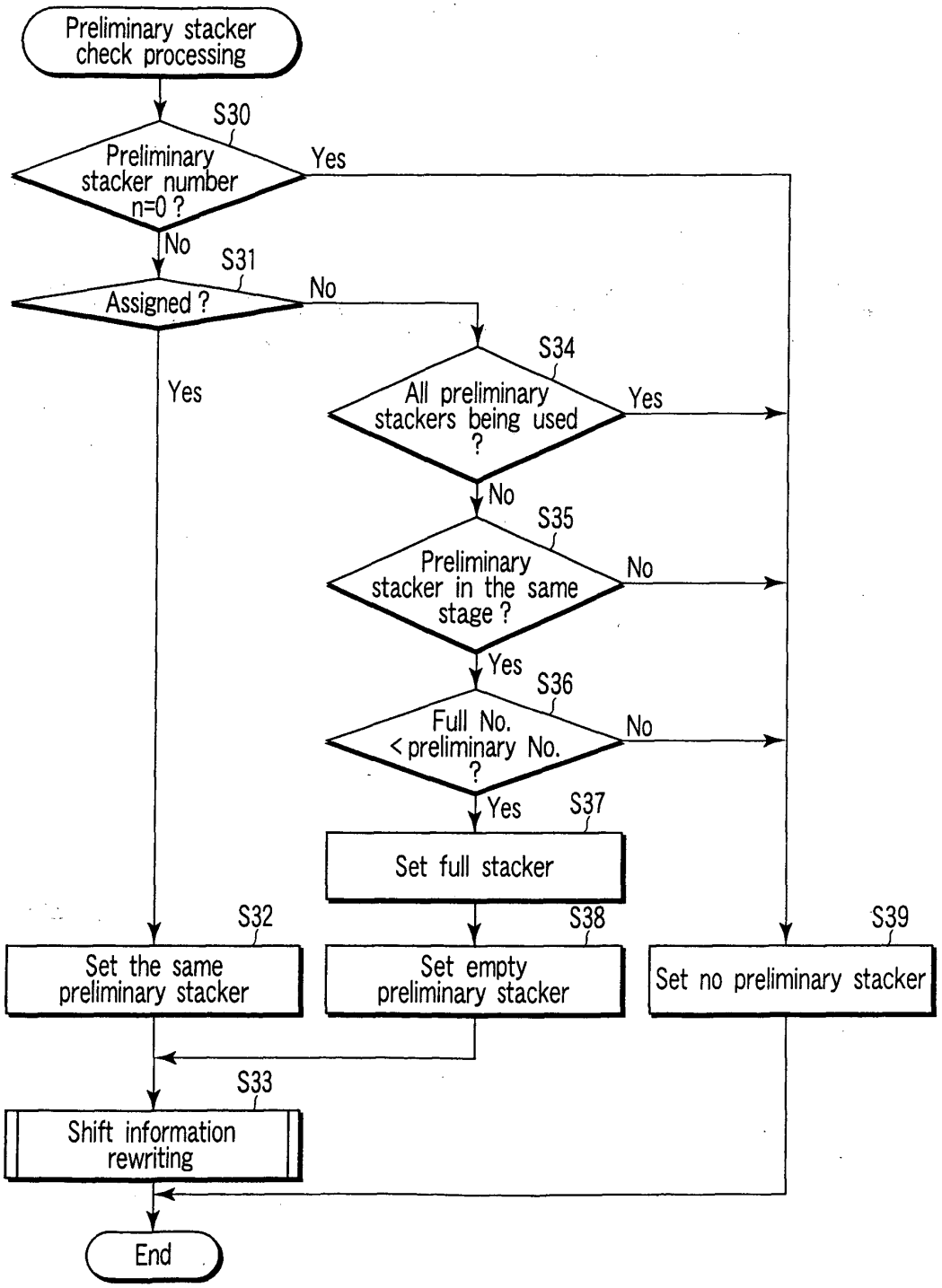
Preliminary stacker check processing
S30
Preliminary stacker number n=0 ?
Yes
No
S31
Assigned ?
No
Yes
S34
All preliminary stackers being used ?
Yes
No
S35
Preliminary stacker in the same stage ?
No
Yes
S36
Full No. < preliminary No. ?
No
Yes
S37
Set full stacker
S32
Set the same preliminary stacker
S38
Set empty preliminary stacker
S39
Set no preliminary stacker
S33
Shift information rewriting
End

FIG. 13

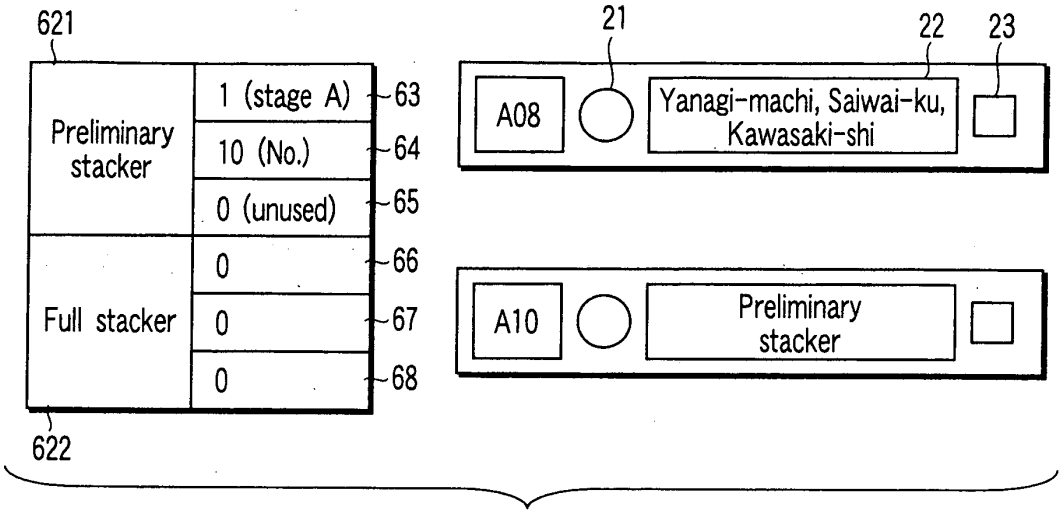
621
Preliminary stacker
Full stacker
1 (stage A)
10 (No.)
0 (unused)
0
0
0
63
64
65
66
67
68
622
21
22
23
A08
Yanagi-machi, Saiwai-ku, Kawasaki-shi
A10
Preliminary stacker

FIG. 14

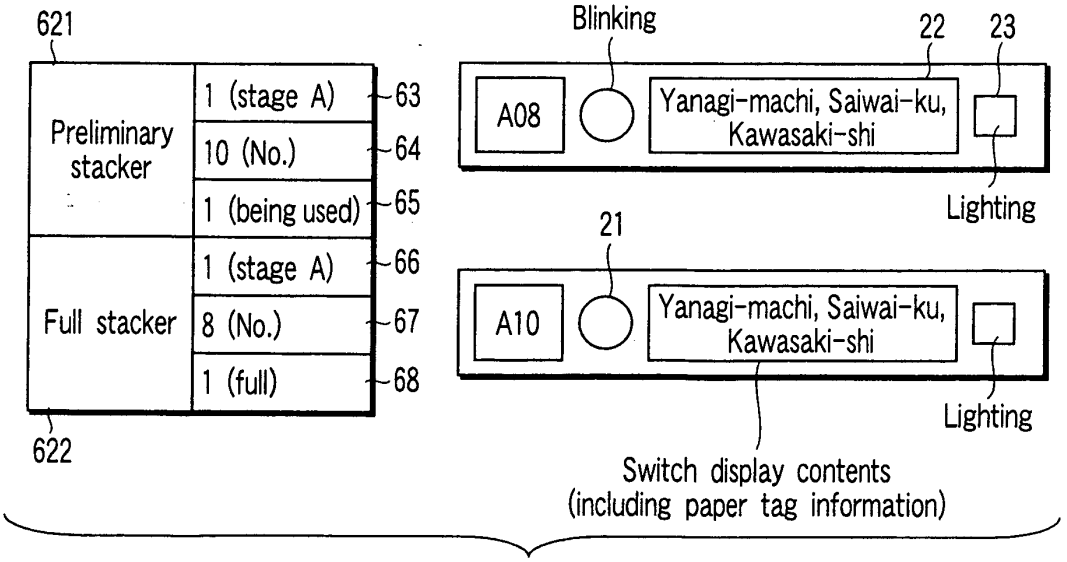
621
Preliminary stacker
Full stacker
1 (stage A)
10 (No.)
1 (being used)
1 (stage A)
8 (No.)
1 (full)
63
64
65
66
67
68
622
Blinking
22
23
A08
Yanagi-machi, Saiwai-ku, Kawasaki-shi
Lighting
21
A10
Yanagi-machi, Saiwai-ku, Kawasaki-shi
Lighting
Switch display contents
(including paper tag information)

FIG. 15

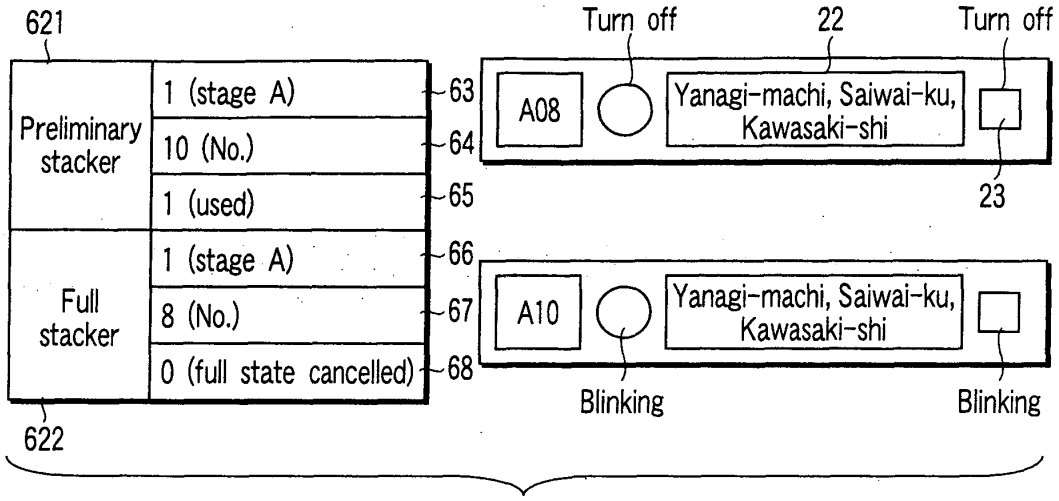
621
Preliminary stacker
1 (stage A)
10 (No.)
1 (used)
Full stacker
1 (stage A)
8 (No.)
0 (full state cancelled)
622
63
64
65
66
67
68
Turn off
22
Turn off
A08
Yanagi-machi, Saiwai-ku, Kawasaki-shi
23
A10
Yanagi-machi, Saiwai-ku, Kawasaki-shi
Blinking
Blinking

FIG. 16

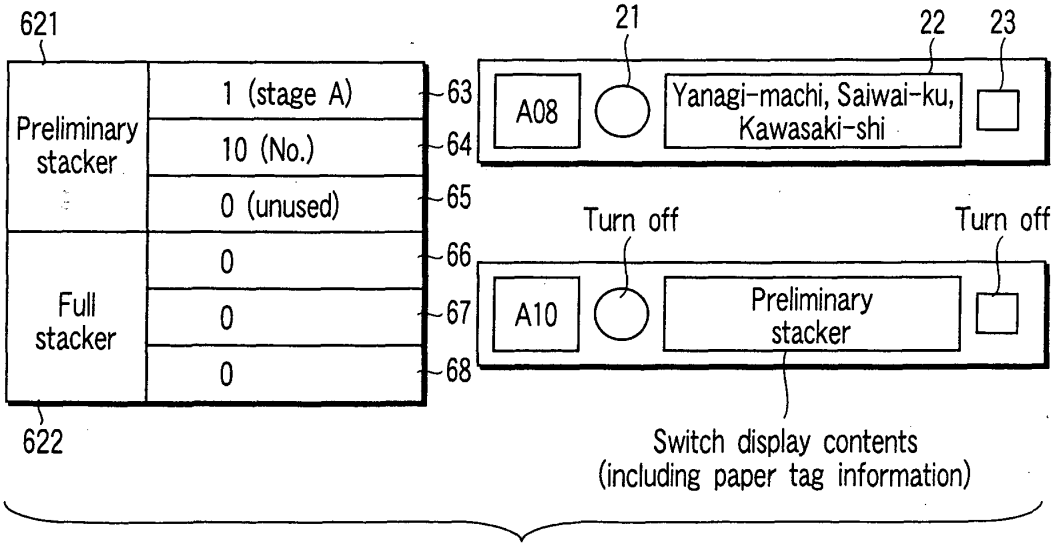
621
Preliminary stacker
1 (stage A)
10 (No.)
0 (unused)
Full stacker
0
0
0
622
63
64
65
66
67
68
21
22
23
A08
Yanagi-machi, Saiwai-ku, Kawasaki-shi
Turn off
Turn off
A10
Preliminary stacker
Switch display contents
(including paper tag information)

FIG. 17

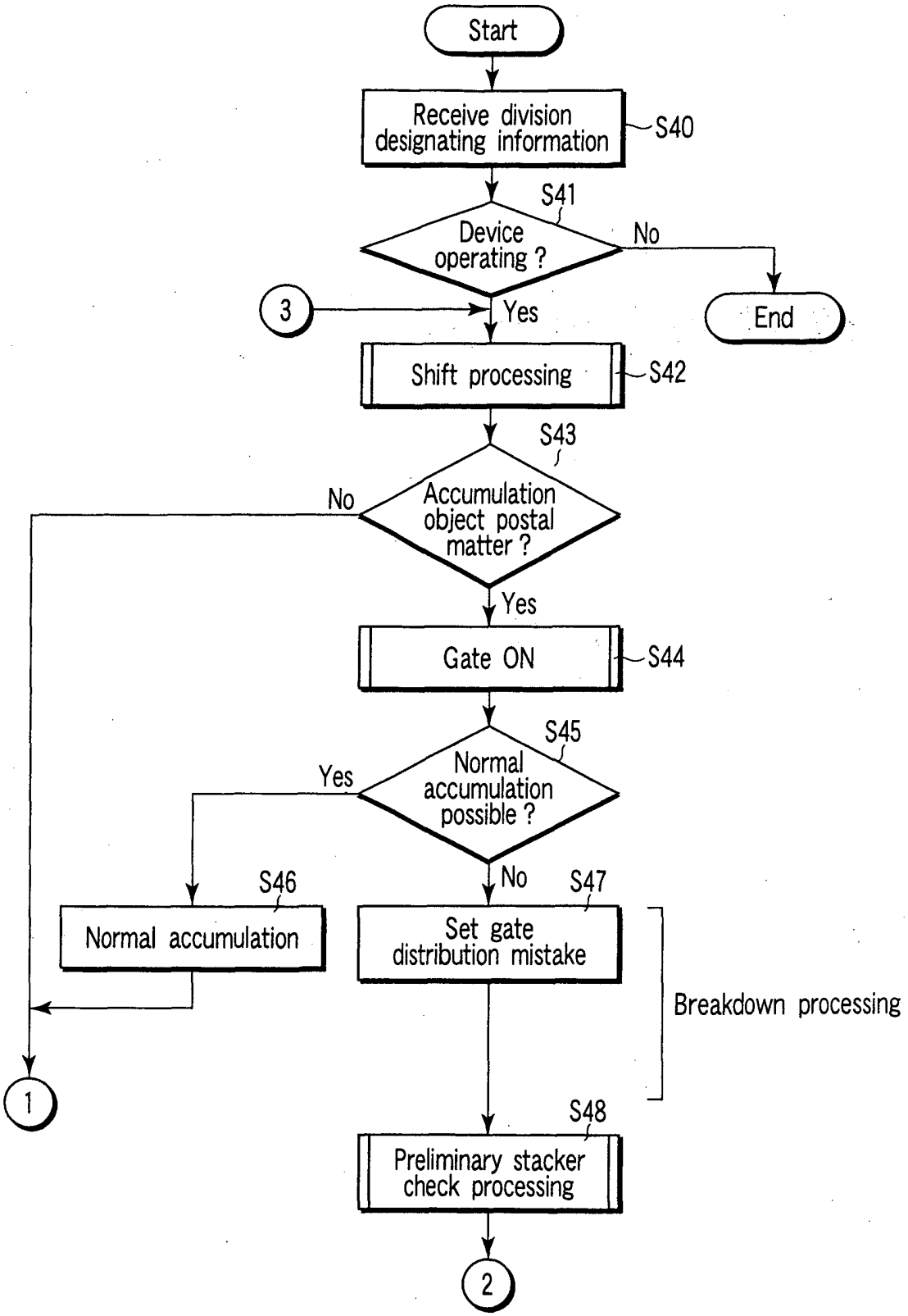
Start
Receive division designating information
S40
S41
Device operating ?
No
End
3
Yes
Shift processing
S42
S43
Accumulation object postal matter ?
No
Yes
Gate ON
S44
S45
Normal accumulation possible ?
Yes
No
S46
Normal accumulation
S47
Set gate distribution mistake
Breakdown processing
1
S48
Preliminary stacker check processing
2

FIG. 18

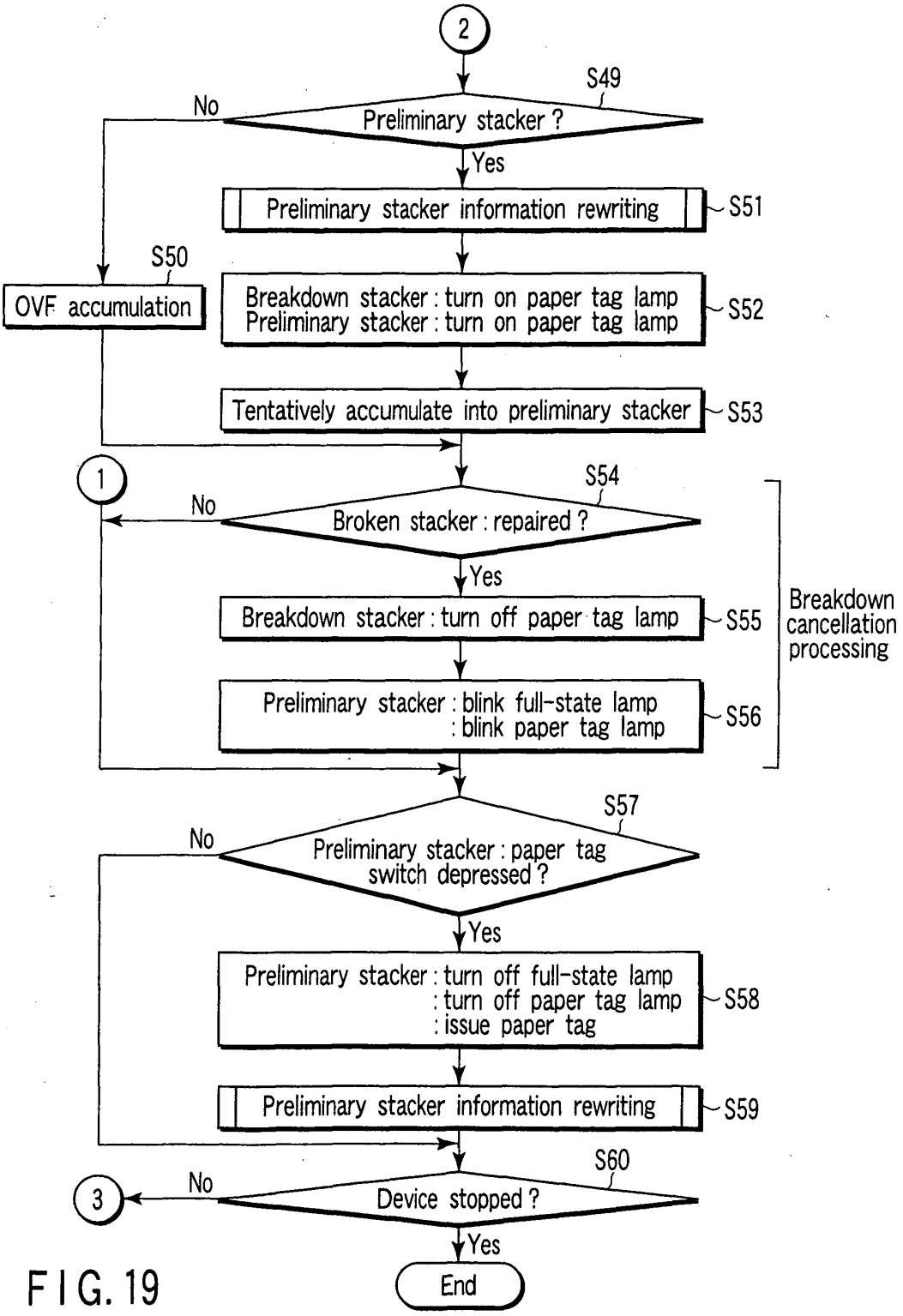
2
S49
No
Preliminary stacker ?
Yes
Preliminary stacker information rewriting
S51
S50
OVF accumulation
Breakdown stacker : turn on paper tag lamp
Preliminary stacker : turn on paper tag lamp
S52
Tentatively accumulate into preliminary stacker
S53
1
S54
No
Broken stacker : repaired ?
Yes
Breakdown stacker : turn off paper tag lamp
S55
Preliminary stacker : blink full-state lamp
: blink paper tag lamp
S56
Breakdown cancellation processing
S57
No
Preliminary stacker : paper tag switch depressed ?
Yes
Preliminary stacker : turn off full-state lamp
: turn off paper tag lamp
: issue paper tag
S58
Preliminary stacker information rewriting
S59
S60
3
No
Device stopped ?
Yes
End

FIG. 19

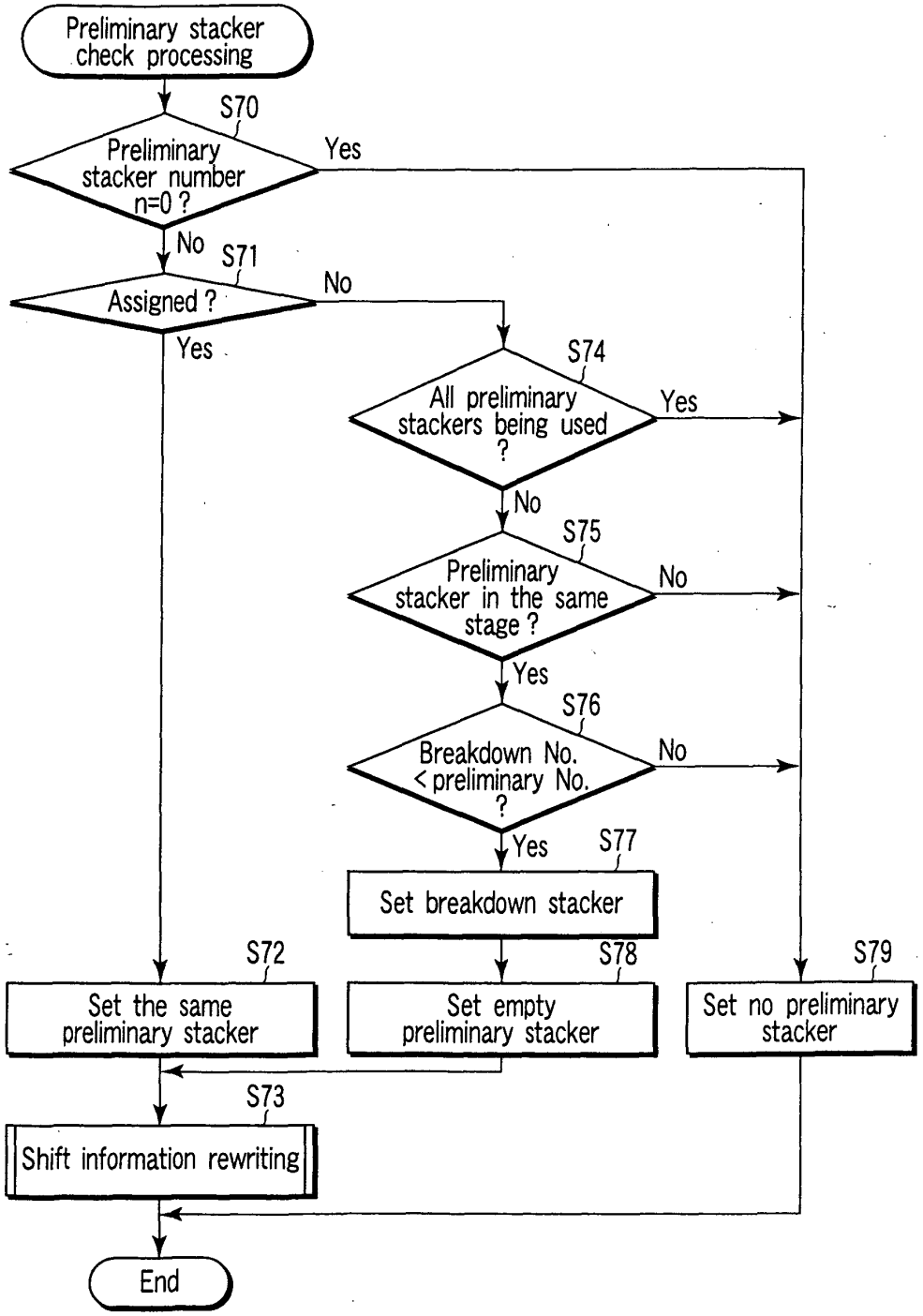
Preliminary stacker check processing
S70
Preliminary stacker number n=0 ?
Yes
No
S71
Assigned ?
No
Yes
S74
All preliminary stackers being used ?
Yes
No
S75
Preliminary stacker in the same stage ?
No
Yes
S76
Breakdown No. < preliminary No. ?
No
Yes
S77
Set breakdown stacker
S72
Set the same preliminary stacker
S78
Set empty preliminary stacker
S79
Set no preliminary stacker
S73
Shift information rewriting
End

FIG. 20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/010958

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B07C3/02, B65H31/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] B07C3/02, B65H31/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005
Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2001-259531 A (Hitachi, Ltd.), 25 September, 2001 (25.09.01), (Family: none)	1-6,9,13-14 7-8,10-12, 15-18
Y	JP 57-156073 A (Tokyo Shibaura Electric Co., Ltd.), 27 September, 1982 (27.09.82), Pay attention to "auxiliary integration box (84a) for secondary section" (Family: none)	7-8,10,18
Y	JP 9-77211 A (Daifuku Co., Ltd.), 25 March, 1997 (25.03.97), Pay attention to "light irradiating type push button (23)" (Family: none)	11-12,15-17

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

* Special categories of cited documents:
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September, 2005 (20.09.05)	11 October, 2005 (11.10.05)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/010958

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-136925 A (Matsushita Electric Industrial Co., Ltd.), 14 May, 2002 (14.05.02), Par. No. [0040] (Family: none)	11-12,15-17
A	JP 5-293446 A (Toshiba Corp.), 09 November, 1993 (09.11.93), (Family: none)	1-18

Form PCT/ISA/210 (continuation of second sheet) (January 2004)