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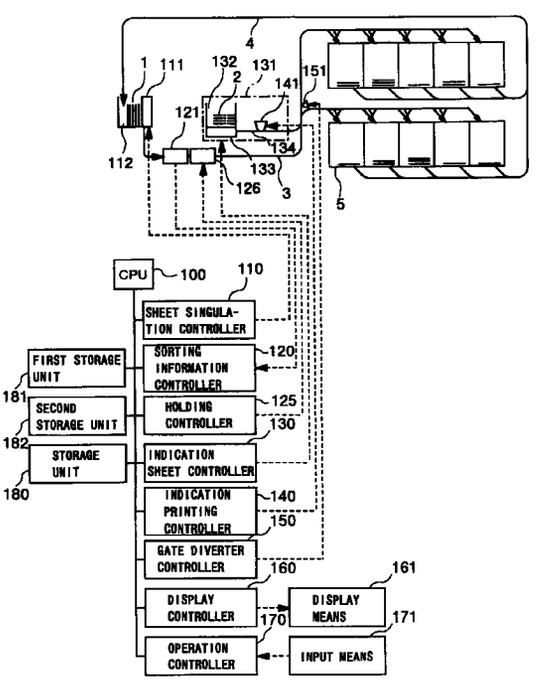
(54) Apparatus for sequencing sheets or the like in carrier route order

(57) A system for sorting sheets in carrier route order within a delivery area has a carrier route sequencing device (1-5) for sorting and sequencing first sheets in carrier route order, first storage means provided in said carrier route sequencing device (1-5) for storing delivery point information within the delivery area of the first sheets which have been sorted and sequenced second storage means provided in said carrier route sequencing device (1-5) for storing delivery point information within the delivery area of the other sheets storage means (180) for storing a sequenced information, by which a combined delivery point information within said delivery area are sequenced in carrier route order, said combined delivery point information comprising a combination of said delivery point information stored in said first storage means and said delivery point information stored in said second storage means; and wherein said carrier route sequencing device (1-5) sorts said first sheets of the like based on said sequenced information stored in said storage means (180).

FIG.1



EP 0 955 102 A2

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an apparatus for sequencing sheets or the like in carrier route order which sorts the sheets or the like by every postal delivery area and sequences them in carrier route order in the delivery area. More particularly, the invention relates to an apparatus for sequencing sheets or the like in carrier route order which interposes an indication sheet representative of existence of registered mail between the sheets or the like sequenced in carrier route order in a delivery area.

[0002] A conventional carrier route sequencing apparatus which sequences sheets or the like such as mail in carrier route order in a delivery area is, for example, a carrier route sequencing system for sheets or the like which is disclosed in Japanese Patent Unexamined Publication No. 63-287584.

[0003] In this conventional system, the sheets or the like to be delivered by a postman, are sorted and sequenced in carrier route order in his delivery area. The postman delivers the sheets or the like which have been sorted and sequenced by the above-described carrier route sequencing system along the carrier route in the delivery area.

[0004] The sheets or the like to be delivered by the postman, include ordinary mail to be delivered in mailboxes at delivery points, and registered mail which require confirmation of reception of receivers when they are delivered. In this connection, the postmen carefully deals with the registered mail separately from the ordinary mail because the registered mail necessitate the confirmation of reception as described above, as well as in view of security of the registered mail during delivery. When delivering the registered mail, the postman should sometimes confirm addresses of the registered mail, often check receipts of the registered mail delivery, or examine a list of the registered mail, in order to prevent erroneous delivery of the registered mail, which may occur while he is delivering the ordinary mail along his carrier route order.

[0005] For the reasons, the postman must perform delivering service while he is always conscious of the delivery of the registered mail, so that he is enormously fatigued. Further, the postman may sometimes pass delivery points and fail to give the registered mail to receivers, due to a mistake in checking the registered mail, the receipts and the list or for some reasons. In such case, the postman has to return to the missed delivery points again, so that an efficiency of delivering the mail is lowered, or the service for the user is unsatisfied because the delivery of the registered mail is delayed.

SUMMARY OF THE INVENTION

[0006] In view of the above-described conventional problems, an object of the present invention is to provide a carrier route sequencing apparatus for sheets or the like which enables a postal worker to efficiently deliver various kinds of mail, such as ordinary mail to be delivered in mailboxes at delivery points and registered mail which require certification of reception of receivers, without a mistake.

[0007] Another object of the invention is to provide a carrier route sequencing apparatus for sheets or the like which can enhance safety in delivering service of a postman.

[0008] To achieve the above-mentioned objects, according to the present invention, there is provided an apparatus for sequencing sheets or the like in carrier route order, comprising: first storage means for storing information of delivery points within a delivery area of first-class sheets or the like which have been sorted by a carrier route sequencing device for sorting and sequencing the sheets or the like in carrier route order in the delivery area; second storage means for storing information of delivery points within a delivery area of second-class sheets or the like which have been sorted and sequenced by the carrier route sequencing device; storage means for storing the delivery point informations within the delivery areas obtained by combining the first delivery point information within the delivery area of the first-class sheets or the like which is stored in the first storage means, and the second delivery point information within the delivery area of the second-class sheets or the like which is stored in the second storage means; and indication sheet interposing means for interposing indication sheets representative of existence of the second-class sheets or the like at the associated points between the first-class sheets or the like sorted and sequenced in accordance with the delivery point informations from the storage means.

[0009] Further, in order to realize the objects, the indication sheet interposing means includes indication sheet container means for containing the indication sheets, indication sheet singulation means (or separation means) for singulating (or taking up) the indication sheets in the indication sheet container means, and indication sheet conveyer means for transferring the indication sheets.

[0010] Furthermore, in order to attain the objects, the indication sheet interposing means includes indication sheet printing means for printing information on the indication sheet.

[0011] The first storage means stores the delivery point information of the first-class sheets or the like sorted and sequenced in carrier route order within the delivery area by the carrier route sequencing device. The second storage means stores the delivery point information of the second-class sheets or the like sorted and sequenced in carrier route order within the delivery

area by the carrier route sequencing device. The storage means combines the first delivery point information within the delivery area of the first-class sheets or the like which is stored in the first storage means and the second delivery point information within the delivery area of the second-class sheets or the like which is stored in the second storage means, into the delivery point informations within the delivery areas of the first-class and second-class sheets or the like. The indication sheet interposing means interposes the indication sheets representative of existence of the second-class sheets or the like at the associated delivery points between the first-class sheets or the like sorted and sequenced in accordance with the delivery point informations from the storage means. Consequently, the postman can recognize and confirm that there are the second-class sheets or the like to be delivered at the delivery points represented by the indication sheets, while devoting himself to delivery of the first-class sheets or the like between which the indication sheets are interposed.

[0012] The indication sheet interposing means can contain the indication sheets having distinctive shapes or colors and interpose the indication sheets substituting for the second-class sheets or the like at the associated address between the first-class sheets or the like in response to the delivery point information from the storage means. Thus, the postman can easily recognize the indication sheets.

[0013] Further, the indication sheet printing means prints information on the indication sheets which serve as receipts to confirm that the second-class sheets or the like are received. The indication sheets substituting for the second-class sheets or the like are interposed at the associated delivery points between the first-class sheets or the like in response to the delivery point information from the storage means. Accordingly, the mailman can easily recognize the indication sheets and use them as the receipts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a schematic view showing one embodiment of an apparatus according to the present invention;

Fig. 2 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 1;

Fig. 3 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 1;

Fig. 4 is a schematic view showing another embodiment of the apparatus according to the invention;

Fig. 5 is a schematic view showing still another embodiment of the apparatus according to the invention;

Fig. 6 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 5;

Fig. 7 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 4;

Fig. 8 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 4;

Fig. 9 is a schematic view showing a further embodiment of the apparatus according to the invention;

Fig. 10 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 9; and

Fig. 11 is a flow chart showing operation procedures of the embodiment of the apparatus according to the invention which is shown in Fig. 9.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The preferred embodiment of the present invention will now be described with reference to the attached drawings.

[0016] Fig. 1 is a schematic view showing a structure of an apparatus for sequencing sheets or the like in carrier route order according to a first embodiment of the invention, such sheets or the like including first-class sheets or the like as ordinary mail and second-class sheets or the like as registered mail.

[0017] First, the structure of the apparatus will be explained with reference to Fig. 1. In Fig. 1, the reference numeral 1 denotes letters such as the ordinary mail (the first-class sheets or the like) or the registered mail (the second-class sheets or the like).

[0018] Numeral 111 designates singulation means for singulating the letters 1 (the first-class or second-class sheets or the like) one by one. 112 shows container means for stacking the letters 1 (the first-class or second-class sheets or the like) to be singulated (or taken up) by the singulation means 111.

[0019] Numeral 121 denotes sorting information reading means for reading sorting information affixed to the letters 1 (the first-class or second-class sheets or the like) singulated by the singulation means 111. The sorting information reading means 121 varies according to the sorting information given to the letters 1 (the first-class or second-class sheets or the like). For example, when characters are written on the letters 1, OCR sorting information reading means is employed. When bar codes are given to the letters 1, bar code sorting reading means is employed. Any other types of the sorting information reading means 121 can be employed.

[0020] Numeral 126 shows holding means for temporarily holding the letters 1 (the first-class or second-class sheets or the like) during conveyance, whose sorting information has been read by the sorting information reading means 121.

[0021] Numeral 2 represents indication sheets. Each

indication sheet is to be interposed between the letters 1 (the first-class or second-class sheets or the like) for indicating existence of the registered mail. 131 denotes indication sheet interposing means for interposing the indication sheets 2 between the letters 1. The indication sheet interposing means 131 comprises indication sheet container means 132, indication sheet separation means 133, indication sheet conveyer means 134 and indication sheet printing means 141 which will be described below.

[0022] The indication sheet container means 132 stacks the indication sheets 2 therein. The indication sheet singulation means 133 singulates the indication sheets 2 contained in the indication sheet container means 132 one by one. The indication sheet conveyer means 134 conveys the indication sheets 2 singulated by the indication sheet singulation means 133. Conventional conveyer means including, for example, opposite belts or rollers is used as the indication sheet conveyer means 134. Any other types of conveyer means may be employed. The indication sheet printing means 141 is provided on the indication sheet conveyer means 134 in order to print information on the indication sheet 2. The indication sheet printing means 141 may be ink-jetting type or thermal type indication sheet printing means. Any other types of printing means may be employed.

[0023] Numeral 5 designates stacking means including a plurality of shelves for sorting and stacking the letters 1 (the first-class or second-class sheets or the like) in accordance with the sorting information thereof. Numeral 3 designates conveyer means which connects the singulation means 111 and the sorting information reading means 121, the sorting information reading means 121 and the holding means 126, and the holding means 126 and the stacking means 5, so as to convey the letters 1 (the first-class or second-class sheets or the like). Conventional conveyer means including, for example, opposite belts or rollers is used as the conveyer means 3. It is needless to say that any other types of conveyer means may be employed.

[0024] Numeral 151 shows gate diverter means for selectively turning a direction of conveyance of the letters 1 (the first-class or second-class sheets or the like) in order to feed them into associated shelves of the stacking means 5 in accordance with the sorting information of the letters 1. In Fig. 1 illustrating the first embodiment, the numeral is given to only one of the gate diverter means, and the remaining gate diverter means are not given the numbers.

[0025] The above-described indication sheet conveyer means 134 is connected to the conveyer means 3 on the upstream side of the first gate diverter means 151 provided for the stacker means 5, as shown in Fig. 1. Numeral 4 represents conveyer means for transferring the letters 1 (the first-class or second-class sheets or the like) in the stacker means 5 to the container means 112. Conventional conveyer means, for example, including opposite belts or rollers is employed as that conveyer means 4. It is needless to say that any other types of conveyer means may be employed.

[0026] Numeral 100 denotes a CPU for controlling storage means and controllers which will be described blow. 110 is a sheet singulation controller for controlling the singulation means 111 for singulating (or taking up) the letters 1 (the first-class or second-class sheets or the like) one by one. 120 is a sorting information controller for controlling the sorting information reading means 121 for reading the sorting information given to the letters 1 (the first-class or second-class sheets or the like). 125 is a holding controller for controlling the holding means 126 for temporarily holding the letters 1 (the first-class or second-class sheets or the like) during the conveyance, whose sorting information has been read by the sorting information reading means 121. 130 is an indication sheet controller for controlling the indication sheet singulation means 133 serving to singulate the indication sheets 2 one by one, which sheets 2 are stacked in the indication sheet container means 132. 140 is an indication printing controller for controlling the indication sheet printing means 141 provided on the indication sheet conveyer means 134 so as to print information on the indication sheets 2. 150 is a gate diverter controller for controlling the gate diverter means 151 and the remaining gate means shown in Fig 1.

[0027] Numeral 161 designates display means for indicating information. Numeral 160 is a display controller for controlling the display means 161. Numeral 171 designates input means for inputting information. Numeral 170 designates an operation controller for controlling the input means 171.

[0028] Numeral 181 designates a first storage unit for storing delivery point information of the first-class sheets or the like within a delivery area thereof. Numeral 182 designates a second storage unit for storing delivery point information of the second-class sheets or the like within a delivery area thereof. 180 is a storage for storing the delivery point informations within the delivery areas of the first-class and second-class sheets or the like or all the delivery point informations within the delivery areas and various kinds of informations of the respective controllers and storages.

[0029] The apparatus according to the above-described first embodiment of the invention will be described hereinafter with reference to flowcharts of Figs. 2 and 3, as for a case where the first-class sheets or the like which are the ordinary mail and the second-class sheets or the like which are the registered mail are sequenced in carrier route order.

[0030] A method of sequencing the sheets or the like will now be described. This method is similar to a playing-card sequencing way by which the cards are sorted by trump marks and then sequenced in order. Referring to Fig. 2, the letters 1 (the second-class sheets or the like) to be delivered, which are the registered mail, are at first set in the container means 112 (step 500). Then, the letters 1 (the second-class sheets or the like) set in

the container means 112 are singulated (or taken up) by the singulation means 111 in response to control signals from the sheet singulation controller 110 (step 501).

[0031] The singulated letter 1 (the second-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1 (the second-class sheet) is read (step 502). The read sorting information is stored in the second storage unit 182 via the sorting information controller 120 (step 503).

[0032] Also, a position of an associated stacking shelf in which the letter should be contained is recognized from the read sorting information of the letter (step 504). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 for the purpose of feeding the letter 1 (the second-class sheet or the like) into the associated stacking shelf (step 505). The conveyer means 3 supplies to the associated shelf of the stacking shelf means 5, via the holding means 126, the letter 1 (the second-class sheet or the like) whose sorting information has been read by the sorting information reading means 121. The letter 1 is stacked in the associated shelf by being guided by the previously-controlled gate diverter means 151 (step 506). It is checked whether or not the letters 1 (the second-class sheets or the like) set in the container means 112 exist (step 507).

[0033] If the letters 1 (the second-class sheets or the like) set in the container means 112 exist, the operation proceeds to the step 501. If they do not exist, the operation proceeds to a step 509 (step 508).

[0034] It is checked that all the letters 1 (the second-class sheets or the like) of the registered mail, set in the container means 112, have been sequenced in carrier route order (step 509). If the sequencing of the letters is completed, the operation proceeds to a step 512, and if the sequencing is not completed, the operation proceeds to a step 511 (step 510). The letters 1 (the second-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom and successively transferred to the container means 112 through the take-out conveyer passage 4, and the operation proceeds to the step 501 (step 511). The sorting information of the letter 1 belonging to registered mail which could not be read is input from the input means 171 and stored in the second storage unit 182.

[0035] The letter 1 (the second-class sheet or the like) is manually interposed at the associated point between the registered mail which have been sequenced in carrier route order. The registered mail (the second-class sheets or the like) are taken out of the stacking shelf means 5 to the outside of the carrier route sequencing apparatus (step 512).

[0036] Next, the letters 1 (the first-class sheets or the like) to be delivered, which are the ordinary mail, are set in the container means 112 (step 513). Then, the letters 1 (the first-class sheets or the like) set in the container means 112 are taken up by the singulation means 111 in response to control signals from the sheet singulation controller 110 (step 514).

[0037] The singulated letter 1 (the first-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1 (the first kind of sheet or the like) is read (step 515). The read sorting information is stored in the first storage unit 181 via the sorting information controller 120 (step 516).

[0038] A position of an associated stacking shelf where the letter should be contained is recognized from the read sorting information (step 517). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 for the purpose of feeding the letter 1 (the first-class sheet or the like) into in the associated stacking shelf (step 518).

[0039] The conveyer means 3 supplies to the associated shelf of the stacking shelf means 5, via the holding means 126, the letter 1 (the first-class sheet or the like) whose sorting information has been read by the sorting information reading means 121. The letter 1 is stacked in the associated shelf by being guided by the previously-controlled gate diverter means 151 (step 519). It is checked whether or not the letters 1 (the first-class sheets or the like) set in the container means 112 exist (step 520).

[0040] If the letters 1 set in the container means 112 exist, the operation proceeds to the step 514. If they do not exist, the operation proceeds to a step 522 (step 521).

[0041] It is determined whether the following operation is an operation at a step of sorting the letters 1 (the first-class sheets or the like) by every delivery point or an operation at a provisional step in the carrier route sequencing operation for the letters 1 set in the container means 112 which are the ordinary mail (step 522). More specifically, the operation at the step of sorting by every delivery point is performed in a state that each shelf of the stacking shelf means 5 is allotted a delivery point. The operation at the provisional step is performed in a state that each shelf of the stacking shelf means 5 is allotted a plurality of delivery points.

[0042] If it is the operation at the provisional step, the operation proceeds to a step 524, and if it is the operation at the step of sorting by delivery bases, the operation proceeds to a step 525 (step 523). The letters 1 (the first-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom, so as to be successively shifted to the container means 112 through the take-out conveyer passage 4, and the operation proceeds to the step 514 (step 524). The letters 1 (the first-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom, so as to be successively transferred to the container means 112

through the take-out conveyer passage 4, and the operation proceeds to a step 526 in Fig. 3 (step 525).

[0043] In Fig. 3, the sorting informations of the second-class sheets or the like stored in the second storage unit 182, are sequenced in carrier route order, and the sequenced informations are stored in the second storage unit 182 (step 526). The sorting informations of the first-class sheets or the like stored in the first storage unit 181, are sequenced in carrier route order, and the sequenced informations are stored in the first storage 181 (step 527). The sorting informations stored in the first and second storage units 181 and 182 which have been sequenced in carrier route order are combined, and all the sorting informations are sequenced in carrier route order, the sequenced informations being stored in the storage unit 180 (528). The respective shelves of the stacking shelf means 5 are allotted the sorting informations stored in the storage unit 180 in accordance with the orders of the delivery points (step 529).

[0044] It is checked whether or not the sorting informations of the second-class sheets or the like corresponding to the delivery points allotted to the respective shelves of the stacking shelf means 5, exist in the sorting informations stored in the storage unit 180 (step 530). If the sorting informations of the second-class sheets or the like do not exist, the operation proceeds to a step 536, and if they exist, the operation proceeds to a step 532 in which the indication sheet interposing means 131 is driven (step 531). One of the indication sheets 2 stacked in the indication sheet container means 132 is singulated by the indication sheet singulation means 133 in response to a control signal from the indication sheet controller 130 (step 532).

[0045] The singulated indication sheet 2 is fed to the indication sheet printing means 141 by the indication sheet conveyer means 134. The indication sheet printing means 141 is controlled in response to a control signal from the indication printing controller 140 so as to print information on the indication sheet 2 (step 533). The gate diverter means 151 is controlled for supplying the indication sheet 2 into a shelf of the stacking shelf means 5 associated with the sorting information. The indication sheet 2 is fed by the indication sheet conveyer means 134 and the conveyer means 3 so that it is stacked in the associated shelf of the stacking shelf means 5, guided by the previously-controlled gate diverter means 151 (step 534).

[0046] The sorting information allowing the indication sheet 2 to be issued is removed from the storage 180, and the operation proceeds to the step 530 (step 535). In the case where the sheets or the like wait in the holding means 126, they are supplied into associated shelves of the stacking shelf means 5 in accordance with their sorting informations. If no sheets wait in the holding means 126, the operation proceeds to a step 537 (step 536). The letters 1 (the first-class sheets or the like) set in the container means 112 are singulated by the singulation means 111 in response to control signals from the sheet singulation controller 110 (step 537).

[0047] The singulated letter 1 (the first-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1 (the first-class sheet or the like) is read (step 538). It is checked whether or not the read sorting information corresponds to any of the delivery points allotted to the respective shelves of the stacking shelf means 5 (step 539). If it does not correspond, the operation proceeds to a step 541, and if it corresponds, the operation proceeds to a step 542 (step 540). The sheet or the like is temporarily held by the holding means 126 in response to a control signal from the holding controller 125, and the operation proceeds to a step 529 (step 541). A position of an associated shelf where the sheet or the like should be contained is recognized from the read sorting information (step 542). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 in order to supply the letter 1 (the first-class sheet or the like) into the associated stacking shelf (step 543).

[0048] The conveyer means 3 supplies to the associated shelf of the stacking shelf means 5, via the holding means 126, the letter 1 (the first-class sheet or the like) whose sorting information has been read by the sorting information reading means 121. The letter 1 is stacked in the associated shelf of the stacking shelf means 5, guided by the previously-controlled gate diverter means 151 (step 544). The sorting information corresponding to the letter 1 (the first-class sheet or the like) contained in the associated shelf of the stacking shelf means 5 is removed from the storage 180 (step 545). It is checked whether or not the letters 1 (the first-class sheets or the like) set in the container means 112 exist (step 546). If the letters 1 set in the container means 112 exist, the operation proceeds to the step 536, and if they do not exist, the operation proceeds to a step 548 (step 547). Thus, the operation is finished and stopped (step 548).

[0049] As described above, according to the first embodiment of the invention, the indication sheets can be interposed at the associated delivery points among the ordinary mail in substitution for the registered mail, such ordinary mail having been sorted and sequenced in carrier route order. Accordingly, a postman can deliver the mail efficiently without a mistake.

[0050] Also, because the indication sheets having distinctive shapes or colors which make it easy to discriminate them, can be interposed by the indication sheet interposing means 131, the postman can deliver the mail more efficiently without a mistake.

[0051] Further, because the information can be printed on the indication sheets 2, they are usable as receipts for the registered mail.

[0052] According to the above-described first embodiment, the letters 1 (the first-class or second-class

sheets or the like) sorted and stacked in the stacking shelf means 5 are automatically transferred to the container means 112 through the conveyer passage 4. However, even when the letters are manually transferred, a similar effect can be obtained.

[0053] Moreover, according to the first embodiment, the indication sheet interposing means 131 includes the indication sheet printing means 141. If it is unnecessary to print information on the indication sheet, the indication sheet printing means 141 can be omitted.

[0054] An apparatus according to a second embodiment of the invention will be described below with reference to Figs. 4 and 5.

[0055] Fig. 4 is a schematic view showing a structure of a carrier route sequencing apparatus including a carrier route sequencing device for first-class sheets or the like and indication sheet interposing means for interposing indication sheets substituting for second-class sheets or the like. Fig. 5 is a schematic view showing a structure of a carrier route sequencing device for the second-class sheets or the like. A description is made herein, regarding the first-class sheets or the like as ordinary mail and the second-class sheets or the like as registered mail.

[0056] In Fig. 4, the same reference numerals designate the same or corresponding component parts as those in Fig. 1. Different points of the second embodiment from the first embodiment shown in Fig. 1 will now be described. Reference numeral 1a designates letters such as the ordinary mail (the first-class sheets or the like). Numeral 111 designates singulation means for singulating the letters 1a (the first-class sheets or the like) one by one. 112 shows container means for stacking letters 1a (the first-class sheets or the like) therein.

[0057] Numeral 121 denotes sorting information reading means for reading sorting information affixed to the letters 1a (the first-class sheets or the like) singulated by the singulation means 111. The sorting information reading means 121 varies according to the sorting information given to the letters 1a (the first-class sheets or the like). For example, when characters are written on the letters 1a, OCR sorting information reading means is employed. When bar codes are given to the letters 1a, bar code sorting reading means is employed. Any other types of the sorting information reading means 121 can be employed. Numeral 126 shows holding means for temporarily holding the letters 1a (the first-class sheets or the like) during conveyance, whose sorting information has been read by the sorting information reading means 121.

[0058] Numeral 2 represents indication sheets. Each indication sheet is to be interposed between the letters 1a (the first-class sheets or the like) for indicating existence of the registered mail. Numeral 5 designates stacking shelf means including a plurality of shelves for sorting and stacking the letters 1a (the first-class sheets or the like) in accordance with the sorting information thereof. Numeral 3 denotes conveyer means which connects the singulation means 111 and the sorting information reading means 121, the sorting information reading means 121 and the holding means 126, and the holding means 126 and the stacking shelf means 5, so as to convey the letters 1a (the first-class sheets or the like). Numeral 151 shows gate diverter means for selectively turning a direction of conveyance of the letters 1a (the first-class sheets or the like) in order to feed them into associated shelves of the stacking shelf means 5 in accordance with the sorting information of the letters 1a. In Fig. 4 illustrating the second embodiment, the numeral is given to only one of the gate diverter means, and the remaining gate diverter means are not given the numbers. Indication sheet conveyer means 134 is connected to the conveyer means 3 on the upstream side of the first gate diverter means 151 provided for the stacking shelf means 5, as shown in Fig. 4. Numeral 4 represents conveyer means for transferring the letters 1a (the first-class sheets or the like) in the stacking shelf means 5 to the container means 112.

[0059] Numeral 110 is a sheet singulation controller for controlling the singulation means 111 for singulating the letters 1a (the first-class sheets or the like) one by one. 120 is a sorting information controller for controlling the sorting information reading means 121 for reading the sorting information given to the letters 1a (the first-class sheets or the like). 125 is a stand-by controller for controlling the holding means 126 for temporarily holding the letters 1a (the first-class sheets or the like) during the conveyance, whose sorting information has been read by the sorting information reading means 121. 150 is a gate diverter controller for controlling the gate diverter means 151 and the remaining gate diverter means shown in Fig 4. 190 is a transmission controller for inputting or outputting information.

[0060] In Fig. 5, the reference numeral 1b designates letters such as the registered mail (the second-class sheets or the like). Numeral 211 designates singulation means for singulating the letters 1b (the second-class sheets or the like) one by one. 212 shows container means for stacking letters 1b (the second-class sheets or the like) therein.

[0061] Numeral 221 denotes sorting information reading means for reading sorting information affixed to the letters 1b (the second-class sheets or the like) singulated by the singulation means 211. The sorting information reading means 221 varies according to the sorting information given to the letters 1b (the second-class sheets or the like). For example, when characters are written on the letters 1b, OCR sorting information reading means is employed. When bar codes are given to the letters 1b, bar code sorting reading means is employed. Any other types of the sorting information reading means 221 can be employed.

[0062] Numeral 205 designates stacking shelf means including a plurality of shelves for sorting and stacking the letters 1b (the second-class sheets or the like) in accordance with the sorting information thereof.

Numeral 203 denotes conveyer means which connects the singulation means 211 and the sorting information reading means 221, and the sorting information reading means 221 and the stacking shelf means 205, so as to convey the letters 1b (the second-class sheets or the like). Conventional conveyer means including, for example, opposite belts or rollers is used as the conveyer means 203. Any other types of conveyer means may be employed. Numeral 251 shows gate diverter means for selectively turning a direction of conveyance of the letters 1b (the second-class sheets or the like) in order to feed them into associated shelves of the stacking shelf means 205 in accordance with the sorting information of the letters 1b. In Fig. 5 illustrating this embodiment, the numeral is given to only one of the gate diverter means, and the remaining gate diverter means are not given the numbers. Numeral 204 represents conveyer means for shifting the letters 1b (the second-class sheets or the like) in the stacking shelf means 205 to the container means 212. Conventional conveyer means, for example, including opposite belts or rollers is employed as the conveyer means 204. It is needless to say that any other types of conveyer means may be employed.

[0063] Numeral 200 designates a CPU for controlling storage units and controllers which will be described below. 210 is a sheet singulation controller for controlling the singulation means 211 for singulating the letters 1b (the second-class sheets or the like) one by one. 220 is a sorting information controller for controlling the sorting information reading means 221 for reading the sorting information given to the letters 1b (the second-class sheets or the like). 250 is a gate diverter controller for controlling the gate diverter means 251 and the remaining gate diverter means shown in Fig 5.

[0064] Numeral 261 designates display means for indicating information. Numeral 260 is a display controller for controlling the display means 261. Numeral 271 denotes input means for inputting information. 270 is an operation controller for controlling the input means 271. 280 is a storage unit for storing delivery point information of the second-class sheets or the like within the delivery area thereof. 290 is a transmission controller for inputting or outputting information.

[0065] The apparatus according to the above-described second embodiment of the invention will be described hereinafter with reference to flowcharts of Figs. 6, 7 and 8, regarding the first-class sheets or the like as the ordinary mail and the second-class sheets or the like as the registered mail. A method of sequencing the sheets or the like is similar to a playing-card sequencing way by which the cards are sorted by trump marks and then sequenced in order. As for the order of operation procedures, the registered mail of the second-class sheets or the like are first processed, and indication sheets substituting for the second-class sheets or the like are then interposed between the first-class sheets or the like while processing the first-class sheets or the like.

[0066] At first, the operation of processing the registered mail which are the second-class sheets or the like will be explained with reference to the schematic view of Fig. 5 and the flowchart of Fig. 6.

[0067] The letters 1b (the second-class sheets or the like) to be delivered, which are the registered mail, are set in the container means 212 (step 600). Then, the letters 1b (the second-class sheets or the like) set in the container means 212 are singulated by the singulation means 211 in response to control signals from the sheet singulation controller 210 (step 601). The singulated letter 1b (the second-class sheet or the like) is fed to the sorting information reading means 221 by the conveyer means 203, where the sorting information written on the letter 1b (the second-class sheet) is read (step 602). The read sorting information is stored in the storage unit 280 via the sorting information controller 220 (step 603).

[0068] Also, a position of an associated stacking shelf in which the letter should be stacked is recognized from the read sorting information of the letter (step 604). According to the recognized information, the gate diverter means 251 is driven in response to a control signal of the gate diverter controller 250 for the purpose of feeding the letter 1b (the second-class sheet or the like) into the associated stacking shelf (step 605).

[0069] The letter 1b (the second-class sheet or the like) whose sorting information has been read by the sorting information reading means 221 is stacked in the associated shelf by being guided by the previously-controlled gate diverter means 251 (step 606). It is checked whether or not the letters 1b (the second-class sheets or the like) set in the container means 212 exist (step 607). If the letters 1b (the second-class sheets or the like) set in the container means 212 exist, the operation proceeds to the step 601. If they do not exist, the operation proceeds to a step 609 (step 608).

[0070] It is checked that all the letters 1b (the second-class sheets or the like) of the registered mail, set in the container means 212, have been sequenced in carrier route order (step 609). If the sorting of the letters is completed, the operation proceeds to a step 612, and if the sorting/sequencing is not completed, the operation proceeds to a step 611 (step 610). The letters 1b (the second-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 205 are taken out therefrom and successively transferred to the container means 212 through the take-out conveyer passage 204, and the operation proceeds to the step 601 (step 611).

[0071] The sorting information of the registered mail (the second-class sheet or the like) which could not be read is input from the input means 271 and stored in the second storage unit 280. The registered mail (the second-class sheet or the like) is manually interposed at the associated point between the registered mail which have been sequenced in carrier route order. The registered mail (the second-class sheets or the like) are taken out of the stacking shelf means 205 to the outside

of the carrier route order sequencing apparatus (step 612). The sorting information in the storage unit 280 is transmitted from the transmission controller through access from another part (step 613). The operation is completed and stopped (step 614).

[0072] Next, the operation of interposing indication sheets while processing the ordinary mail which are the first-class sheets or the like will be described with reference to the schematic view of Fig. 4 and the flowcharts of Figs. 7 and 8.

[0073] The letters 1a (the first-class sheets or the like) to be delivered, which are the ordinary mail, are set in the container means 112 (step 700). Then, the letters 1a (the first-class sheets or the like) set in the container means 112 are taken up by the singulation means 111 in response to control signals from the sheet separation controller 110 (step 701).

[0074] The singulated letter 1a (the first-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1a (the first kind of sheet or the like) is read (step 702). The read sorting information is stored in the first storage unit 181 via the sorting information controller 120 (step 703). A position of an associated stacking shelf where the letter should be contained is recognized from the read sorting information (step 704). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 for the purpose of feeding the letter 1a (the first-class sheet or the like) into in the associated stacking shelf (step 705). The conveyer means 3 supplies to the associated shelf of the stacking shelf means 5, via the holding means 126, the letter 1a (the first-class sheet or the like) whose sorting information has been read by the sorting information reading means 121. The letter 1 is stacked in the associated shelf by being guided by the previously-controlled gate diverter means 151 (step 706). It is checked whether or not the letters 1 (the first-class sheets or the like) set in the container means 112 exist (step 707).

[0075] If the letters 1a set in the container means 112 exist, the operation proceeds to the step 701. If they do not exist, the operation proceeds to a step 709 (step 708).

[0076] It is determined whether the following operation is an operation at a step of sorting the letters 1a (the first-class sheets or the like) by every delivery point or an operation at a provisional step in the carrier route sequencing operation for the letters 1a set in the container means 112 which are the ordinary mail (step 709). More specifically, the operation at the step of sorting by every delivery point is performed in a state that each shelf of the stacking shelf means 5 is allotted a delivery point. The operation at the provisional step is performed in a state that each shelf of the stacking shelf means 5 is allotted a plurality of delivery points.

[0077] If it is the operation at the provisional step, the operation proceeds to a step 711, and if it is the operation at the step of sorting by delivery district, the operation proceeds to a step 712 (step 710). The letters 1a (the first-class sheets or the like) sorted and contained in the respective shelves of the stacking shelf means 5 are taken out therefrom, so as to be successively transferred to the container means 112 through the take-out conveyer passage 4, and the operation proceeds to the step 701 (step 711).

[0078] The letters 1a (the first-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom, so as to be successively shifted to the container means 112 through the take-out conveyer passage 4 (step 712). The sorting informations of the second-class sheets or the like are transmitted to the second storage unit 182 from the transmission controller 190, and the operation proceeds to a step 714 in Fig. 8 (step 713).

[0079] In Fig. 8, the sorting informations of the second-class sheets or the like stored in the second storage unit 182, are sequenced in carrier route order, and the sequenced informations are stored in the second storage unit 182 (step 714). The sorting informations of the first-class sheets or the like stored in the first storage unit 181, are sequenced in carrier route order, and the sequenced informations are stored in the first storage unit 181 (step 715). The sorting informations stored in the first and second storage units 181 and 182 which have been sequenced in carrier route order are combined, and all the sorting informations are sequenced in carrier route order, the sequenced informations being stored in the storage unit 180 (step 716). The respective shelves of the stacking shelf means 5 are allotted the sorting informations stored in the storage unit 180 in accordance with the orders of the delivery points (step 717). It is checked whether or not the sorting informations of the second-class sheets or the like corresponding to the delivery points allotted to the respective shelves of the stacking shelf means 5, exist in the sorting informations stored in the storage unit 180 (step 718).

[0080] If the sorting informations of the second-class sheets or the like do not exist, the operation proceeds to a step 724, and if they exist, the operation proceeds to a step 720 in which the indication sheet interposing means 131 is driven (step 719). One of the indication sheets 2 received in the indication sheet container means 132 is singulated by the indication sheet singulation means 133 in response to a control signal from the indication sheet controller 130 (step 720).

[0081] The singulated indication sheet 2 is fed to the indication sheet printing means 141 by the indication sheet conveyer means 134. The indication sheet printing means 141 is controlled in response to a control signal from the indication printing controller 140 so as to print information on the indication sheet 2 (step 721). The gate diverter means 151 is controlled for supplying the indication sheet 2 into a shelf of the stacking shelf

means 5 associated with the sorting information. The indication sheet 2 is fed by the indication sheet conveyer means 134 and the conveyer means 3 so that it is stacked in the associated shelf of the stacking shelf means 5, guided by the previously-controlled gate diverter means 151 (step 722).

[0082] The sorting information allowing the indication sheet 2 to be issued is removed from the storage unit 180, and the operation proceeds to the step 718 (step 723). In the case where the sheets or the like wait in the holding means 126, they are supplied into associated shelves of the stacking shelf means 5 in accordance with their sorting informations. If no sheets wait in the holding means 126, the operation proceeds to a step 725 (step 724). The letters 1a (the first-class sheets or the like) set in the container means 112 are singulated by the singulation means 111 in response to control signals from the sheet singulation controller 110 (step 725). The singulated letter 1a (the first-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1a (the first-class sheet or the like) is read (step 726). It is checked whether or not the read sorting information corresponds to any of the delivery points allotted to the respective shelves of the stacking shelf means 5 (step 727).

[0083] If it does not correspond, the operation proceeds to a step 729, and if it corresponds, the operation proceeds to a step 730 (step 728). The sheet or the like is temporarily held by the holding means 126 in response to a control signal from the stand-by controller 125, and the operation proceeds to the step 717 (step 729). A position of an associated shelf where the sheet or the like should be contained is recognized from the read sorting information (step 730). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 in order to supply the letter 1a (the first-class sheet or the like) into the associated stacking shelf (step 731).

[0084] The conveyer means 3 supplies to the associated shelf of the stacking shelf means 5, via the holding means 126, the letter 1a (the first-class sheet or the like) whose sorting information has been read by the sorting information reading means 121. The letter 1 is stacked in the associated shelf of the stacking shelf means 5, guided by the previously-controlled gate diverter means 151 (step 732). The sorting information corresponding to the letter 1a (the first-class sheet or the like) contained in the associated shelf of the stacking shelf means 5 is removed from the storage unit 180 (step 733). It is checked whether or not the letters 1a (the first-class sheets or the like) set in the container means 112 exist (step 734).

[0085] If the letters 1a (the first-class sheets or the like) set in the container means 112 exist, the operation proceeds to the step 724, and if they do not exist, the operation proceeds to a step 736 (step 735). Thus, the operation is finished and the apparatus stops (step 736).

[0086] As described above, according to this embodiment of the invention, the indication sheets substituting for the registered mail (the second-class sheets or the like) can be interposed at the associated delivery points between the ordinary mail (the first-class sheets or the like) which have been sorted and sequenced in carrier route order, by combining the carrier route order sequencing apparatus including the carrier route sequencing device for the ordinary mail (the first-class sheets or the like) and the indication sheet interposing means for interposing the indication sheets substituting for the registered mail (the second-class sheets or the like), and the carrier route sequencing device for the registered mail (the second-class sheet or the like). As a result, a postman can confirm the delivery points of the registered mail (the second-class sheets or the like) from the indication sheets. Therefore, the mail can be delivered without a mistake and efficiently by the postman. Also, safety in delivering service can be enhanced.

[0087] Further, because the indication sheets having distinctive shapes or colors which make it easy to discriminate them, can be interposed by the indication sheet interposing means 131, the postman can deliver the mail more efficiently without a mistake.

[0088] Furthermore, because the information can be printed on the indication sheets 2, they are usable as receipts for the registered mail (the second-class sheets or the like).

[0089] According to the above-described second embodiment, the ordinary mail (the first-class sheets or the like) sorted and stacked in the stacking shelf means 5 are automatically shifted to the container means 112 through the conveyer passage 4, and the registered mail (the second-class sheets or the like) sorted and stacked in the stacking shelf means 205 are automatically shifted to the container means 212 through the conveyer passage 204. However, even when the letters are manually transferred, a similar effect can be obtained.

[0090] Moreover, according to the second embodiment, the indication sheet interposing means 131 includes the indication sheet printing means 141. If it is unnecessary to print information on the indication sheet, the indication sheet printing means 141 can be omitted.

[0091] An apparatus according to a third embodiment of the invention will be described below with reference to Fig. 9. Fig. 9 is a schematic view showing a structure of a carrier route sequencing apparatus including a carrier route sequencing device for first-class and second-class sheets or the like and indication sheet issuing means for issuing indication sheets substituting for the second-class sheets or the like. A description is made herein, regarding the first-class sheets or the like as ordinary mail and the second-class sheets or the like as

registered mail.

[0092] In Fig. 9, the same reference numerals denote the same or corresponding component parts as those in Fig. 1. Different points of the second embodiment from the first embodiment shown in Fig. 1 will now be described. The reference numeral 1 designates letters or the like such as the ordinary mail (the first-class sheets or the like), the registered mail (the second-class sheets or the like) or the indication sheets. Numeral 111 designates singulation means for singulating the letters 1 (the first-class or second-class sheets or the like, or indication sheets) one by one. 112 shows container means for stacking letters 1 (the first-class or second-class sheets or the like, or indication sheets) therein.

[0093] Numeral 121 designates sorting information reading means for reading sorting information affixed to the letters 1 (the first-class or second-class sheets or the like, or indication sheets) singulated by the singulation means 111. The sorting information reading means 121 varies according to the sorting information given to the letters 1. For example, when characters are written on the letters 1, OCR sorting information reading means is employed. When bar codes are given to the letters 1, bar code sorting reading means is employed. Any other types of the sorting information reading means 121 can be employed.

[0094] Numeral 5 designates stacking shelf means including a plurality of shelves for sorting and stacking the letters 1 (the first-class or second-lass sheets or the like, or indication sheets) in accordance with the sorting information thereof. Numeral 3 denotes conveyer means which connects the singulation means 111 and the sorting information reading means 121, the sorting information reading means 121 and the stacking shelf means 5, so as to convey the letters 1 (the first-class or second-class sheets or the like, or indication sheets). Numeral 151 shows gate diverter means for selectively turning a direction of conveyance of the letters 1 in order to feed them into associated shelves of the stacking shelf means 5 in accordance with the sorting information of the letters 1. In Fig. 9 illustrating the third embodiment, the numeral is given to only one of the gate means, and the remaining gate diverter means are not given the numbers.

[0095] Numeral 4 denotes conveyer means for conveying the letters 1 (the first-class or second-class sheets or the like, or indication sheets) in the stacking shelf means 5 to the container means 112. Numeral 2 represents indication sheets. Each indication sheet is to be interposed between the letters 1 (the first-class sheets or the like) for indicating existence of the second-class sheet or the like, on which indication sheet the sorting information of the second-class sheet or the like is printed. 331 is indication sheet issuing means for issuing the indication sheets 2, which means comprises indication sheet container means 332, indication sheet singulation means 333, indication sheet conveyer means 334, a container 335, and indication sheet printing means 341. The indication sheet container means 332 stacks the indication sheets 2 therein. The indication sheet singulation means 333 singualte the indication sheets 2 contained in the indication sheet container means 332 one by one. The indication sheet conveyer means 334 conveys the indication sheet 2 singulated by the indication sheet singulation means 333, conventional conveyer means including, for example, opposite belts or rollers is used as the indication sheet conveyer means 334. Any other types of conveyer means can be employed. The container 335 stacks the indication sheets 2 conveyed by the indication sheet conveyer means 334.

[0096] The indication sheet printing means 341 is provided on the indication sheet conveyer means 334 in order to print information on the indication sheet 2. The indication sheet printing means 341 may be ink-jetting type or thermal type indication printing means. Any other types of printing means can be employed.

[0097] Numeral 110 is a sheet singulation controller for controlling the singulation means 111 for singulating the letters 1 (the first-class or second-class sheets or the like, or indication sheets) one by one. 120 is a sorting information controller for controlling the sorting information reading means 121 for reading the sorting information given to the letters 1 (the first-class or second-class sheets or the like, or indication sheets). 150 is a gate diverter controller for controlling the gate diverter means 151 and the remaining gate diverter means shown in Fig 9. 330 is an indication sheet controller for controlling the indication sheet separation means 333. 340 is an indication printing controller for controlling the indication sheet printing means 341.

[0098] The apparatus according to the above-described third embodiment of the invention will be described hereinafter with reference to flowcharts of Figs. 10 and 11, regarding the first-class sheets or the like as the ordinary mail and the second-class sheets or the like as the registered mail. A method of sequencing the sheets or the like is similar to a playing-card sequencing way by which the cards are sorted by trump marks and then sequenced in order. As for the order of procedures, the indication sheets substituting for the registered mail which are the second-class sheets or the like, are issued from the indication sheet issuing means while processing the registered mail and thereafter, the ordinary mail which are the first-class sheets or the like and the indication sheets are combined with each other and processed.

[0099] The operation of processing the registered mail which are the first-class sheets or the like will be explained with reference to the schematic view of Fig. 9 and the flowchart of Fig. 10.

[0100] The letters 1 (the second-class sheets or the like) to be delivered, which are the registered mail, are set in the container means 112 (step 800). Then, the letters 1 (the second-class sheets or the like) set in the container means 112 are singulated by the singulation

means 111 in response to control signals from the sheet singulation controller 110 (step 801).

[0101] The singulated letter 1 (the second-class sheet or the like) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1 (the second-class sheet) is read (step 802). A position of an associated stacking shelf in which the letter should be stacked is recognized from the read sorting information of the letter (step 803). According to the recognized information, the gate diverter means 151 is driven in response to a control signal of the gate diverter controller 150 for the purpose of feeding the letter 1 (the second-class sheet or the like) into the associated stacking shelf (step 804).

[0102] The letter 1 (the second-class sheet or the like) whose sorting information has been read by the sorting information reading means 121 is stacked in the associated shelf of the stacking shelf means 5 by being guided by the previously-controlled gate diverter means 151 (step 805). It is determined whether the following operation is an operation at a step of sorting the letters 1 (the second-class sheets or the like) by every delivery point or an operation at a provisional step in the carrier route sequencing operation for the letters 1 set in the container means 112 (step 806). More specifically, the operation at the step of sorting by every delivery point is performed in a state that each shelf of the stacking shelf means 5 is allotted a delivery point. The operation at the provisional step is performed in a state that each shelf of the stacking shelf means 5 is allotted a plurality of delivery points.

[0103] If it is the operation at the provisional step, the operation proceeds to a step 811, and if it is the operation at the step of sorting by delivery points, the operation proceeds to a step 808 (step 807). One of the indication sheet 2 stacked in the indication sheet container means 332 is singulated by the indication sheet singulation means 333 in response to a control signal from the indication sheet controller 330 (step 808).

[0104] The singulated indication sheet 2 is fed to the indication sheet printing means 341 by the indication sheet conveyer means 334. The indication sheet printing means 341 is controlled in response to a control signal from the indication printing controller 340 so as to print information on the indication sheet 2 (step 809). The indication sheet 2 on which the information is printed is stacked in the container 335 by the indication sheet conveyer means 334 (step 810). It is checked whether ornot the letters 1 (the second-class sheets or the like) set in the container means 112 exist (step 811). If the letters 1 (the second-class sheets or the like) set in the container means 112 exist, the operation proceeds to the step 801. If they do not exist, the operation proceeds to a step 813 (step 812).

[0105] It is checked that all the letters 1 (the second-class sheets or the like) of the registered mail, set in the container means 112, have been sequenced in carrier route order (step 813). If the sorting of the letters is completed, the operation proceeds to a step 816, and if the sorting is not completed, the operation proceeds to a step 815 (step 814).

[0106] The letters 1 (the second-class sheets or the like) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom and successively shifted to the container means 112 through the take-out conveyer passage 4, and the operation proceeds to the step 801 (step 815). The sorting information of the registered mail (the second-class sheet or the like) which could not be read is input from the input means 171. According to the sorting information, one of the indication sheets 2 stacked in the indication sheet container means 332 is singulated by the indication sheet singulation means 333 in response to a control signal of the indication sheet controller 330 (step 817). The singulated indication sheet 2 is fed to the indication sheet printing means 341 by the indication sheet conveyer means 334, and the indication sheet printing means 341 is controlled by a control signal of the indication printing controller 340 so as to print information on the indication sheet 2 (step 818). The indication sheet 2 on which the information is printed is stacked in the container 335 by the indication sheet conveyer means 334 (step 819).

[0107] The existence of other registered mail (the second-class sheets or the like) whose sorting information could not be read, is checked (step 820). If they exist, the operation proceeds to the step 816, and if they do not exist, the operation proceeds to a step 822 (step 821). The printed indication sheets 2 stacked in the container 335 is taken out (step 822). Also, the registered mail (the second-class sheets or the like) which have been sequenced in carrier route order are taken out of the carrier route sequencing apparatus.

[0108] Next, the operation of processing the ordinary mail which are the first-class sheets or the like and the indication sheets will be explained with reference to the flowchart of Fig. 11.

[0109] The letters 1 (the first-class sheets or the like, or indication sheets), which are the registered mail to be delivered, are set in the container means 112 (step 823). Then, the letters 1 (the first-class sheets or the like, or indication sheets) set in the container means 112 are singulated by the singulation means 111 in response to control signals from the sheet singulation controller 110 (step 824).

[0110] The singulated letter 1 (the first-class sheet or the like, or indication sheet) is fed to the sorting information reading means 121 by the conveyer means 3, where the sorting information written on the letter 1 is read (step 825). A position of an associated stacking shelf in which the letter should be stacked is recognized from the read sorting information of the letter (step 826). According to the recognized information, the gate diverter diverter means 151 is driven in response to a control signal of the gate controller 150 for the purpose of feeding the letter 1 into the associated stacking shelf

(step 827).

[0111] The letter 1 (the second-class sheet or the like, or indication sheets) whose sorting information has been read by the sorting information reading means 121 is stacked in the associated shelf by being guided by the previously-controlled gate diverter means 151 (step 828). It is checked whether or not the letters 1 set in the container means 112 exist (step 829).

[0112] If the letters 1 set in the container means 112 exist, the operation proceeds to the step 824. If they do not exist, the operation proceeds to a step 831 (step 830).

[0113] It is checked that all the letters 1 (the second-class sheets or the like, or indication sheets) of the registered mail, set in the container means 112, have been sequenced in carrier route order (step 831). If the sequencing of the letters is completed, the operation proceeds to a step 834, and if the sequencing is not completed, the operation proceeds to a step 833 (step 832).

[0114] The letters 1 (the second-class sheets or the like, or indication sheets) sorted and stacked in the respective shelves of the stacking shelf means 5 are taken out therefrom and successively shifted to the container means 112 through the take-out conveyer passage 4, and the operation proceeds to the step 824 (step 833). The operation is finished and stopped (step 834).

[0115] As described above, according to this embodiment of the invention, the indication sheets substituting for the registered mail (the second-class sheets or the like) are issued by the indication sheet issuing means while processing the registered mail, and thereafter, the ordinary mail which are the first-class sheets or the like are combined with the indication sheets so as to be processed for sequencing in carrier route order. As a result, a postman can confirm the of delivery points of the registered mail (the second-class sheets or the like) from the indication sheets. Therefore, the mail can be delivered without a mistake and efficiently by the mailman. Also, safety in delivering service can be enhanced.

[0116] Further, because the indication sheets having distinctive shapes or colors which make it easy to discriminate them, can be interposed by the indication sheet interposing means 331, the postman can deliver the mail more efficiently without a mistake.

[0117] Furthermore, because the information can be printed on the indication sheets 2, they are usable as receipts for the registered mail (the second-class sheets or the like).

[0118] According to the above-described third embodiment, the ordinary mail (the first-class sheets or the like) or the registered mail (the second-class sheets or the like) sorted and stacked in the stacking shelf means 5 are automatically shifted to the container means 112 through the conveyer passage 4. However, even when the letters are manually transferred, a similar effect can be obtained.

[0119] Moreover, in the third embodiment, the indication sheet issuing means 331 is provided integrally with the carrier route order sequencing apparatus. The means 331 may be provided separately from the apparatus.

[0120] In accordance with the invention, the first-class and second-class sheets or the like are sequenced depending on the informations given thereto. When it is necessary to keep the respective sheets or the like separately from each other, the indication sheets exhibiting existence of the second-class sheets or the like can be interposed between the first-class sheets or the like at the associated points, so that it is possible to confirm the existence of the second-class sheets or the like only by checking the first-class sheets or the like. Therefore, any mistake in confirming the existence of the second-class sheets is eliminated and the postman can deliver the mail efficiently. Thus, reliability and safety in postal delivery service can be enhanced.

Claims

1. A system for sorting sheets or the like in carrier route order which sorts and sequences the sheets or the like in carrier route order within a delivery area, characterized by:

   a carrier route sequencing device (1-5) for sorting and sequencing first sheets or the like in carrier route order within a delivery area thereof;
   first storage means provided in said carrier route sequencing device (1-5) for storing delivery point information within the delivery area of the first sheets or the like which have been sorted and sequenced by said carrier route sequencing device (1-5);
   second storage means provided in said carrier route sequencing device (1-5) for storing delivery point information within the delivery area of the other sheets or the like; and
   storage means (180) for storing a sequenced information, by which a combined delivery point information within said delivery area are sequenced in carrier route order, said combined delivery point information comprising a combination of said delivery point information stored in said first storage means and said delivery point information stored in said second storage means; and
   wherein said carrier route sequencing device (1-5) sorts said first sheets or the like based on said sequenced information stored in said storage means (180).

2. A system according to claim 1, further comprising container means for stacking sheets or the like to

be singulated by a singulation means, and conveyor means (4) for feeding to said container means said first sheets or the like which are stacked in a stacking means (5) after said delivery point information stored in said first storage means is taken out.

3. A system according to claim 2, wherein said conveyor means (4) takes out said first sheets or the like stored in said stacking means (5) from below.

4. A system according to claim 1, wherein said carrier route sequencing device (1-5) allots said first sheets or the like to respective shelves of said stacking means (5) in accordance with said sequenced information stored in said storage means (180) in order to sequence said first sheets or the like in accordance with said sequenced information stored in said storage means (180).

5. A system according to claim 1, wherein said carrier route sequencing device (1-5) issues indication sheets (2) to corresponding stacking shelves if sorting information of the other sheets or the like corresponding to delivery points allotted to respective stacking shelves of said stacking means (5) is existent.

FIG.1

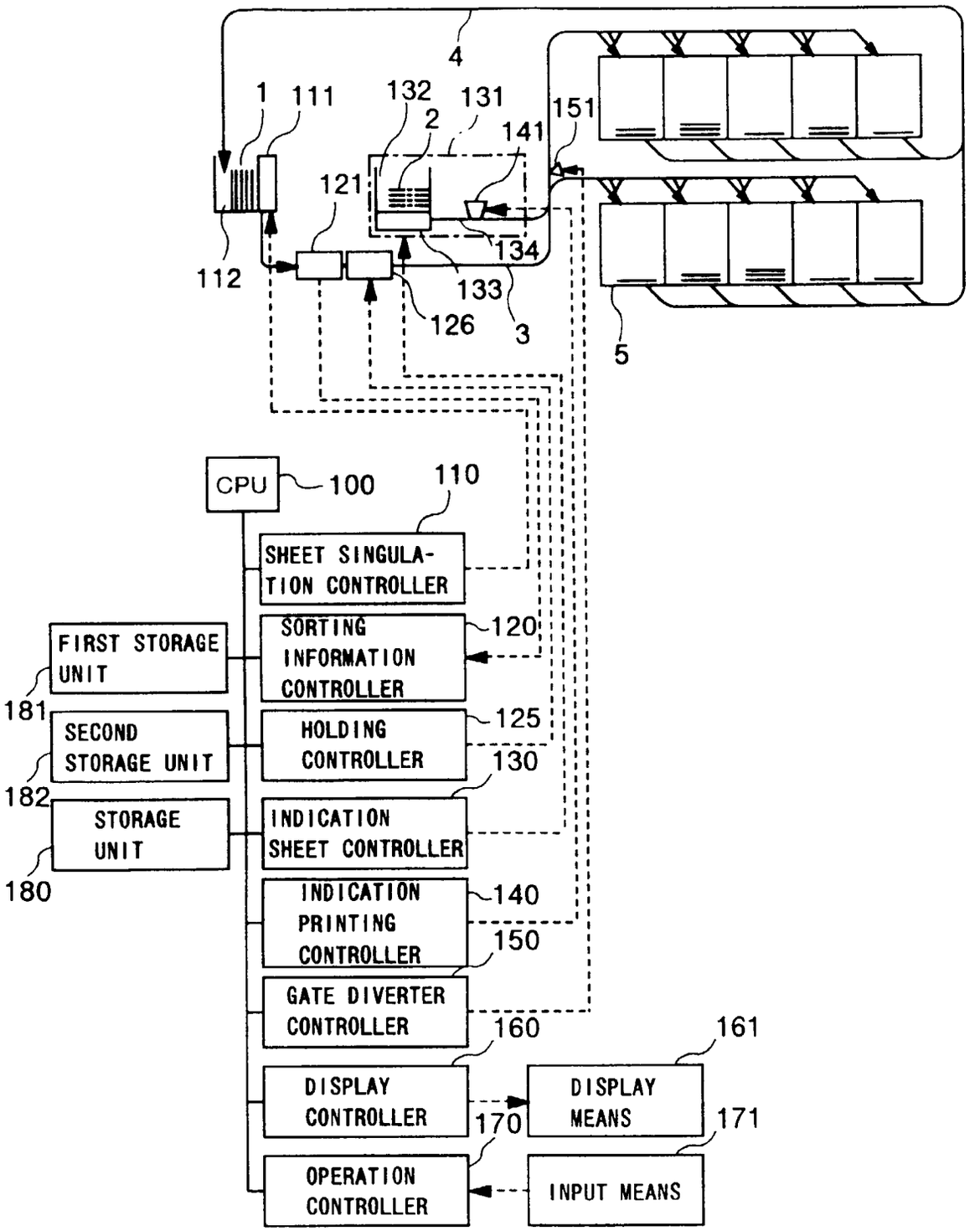

4
1
111
132
131
2
141
151
121
134
112
133
126
3
5
CPU
100
110
SHEET SINGULA-TION CONTROLLER
FIRST STORAGE UNIT
181
SORTING INFORMATION CONTROLLER
120
SECOND STORAGE UNIT
182
HOLDING CONTROLLER
125
130
STORAGE UNIT
180
INDICATION SHEET CONTROLLER
INDICATION PRINTING CONTROLLER
140
150
GATE DIVERTER CONTROLLER
160
161
DISPLAY CONTROLLER
DISPLAY MEANS
170
171
OPERATION CONTROLLER
INPUT MEANS

FIG.2

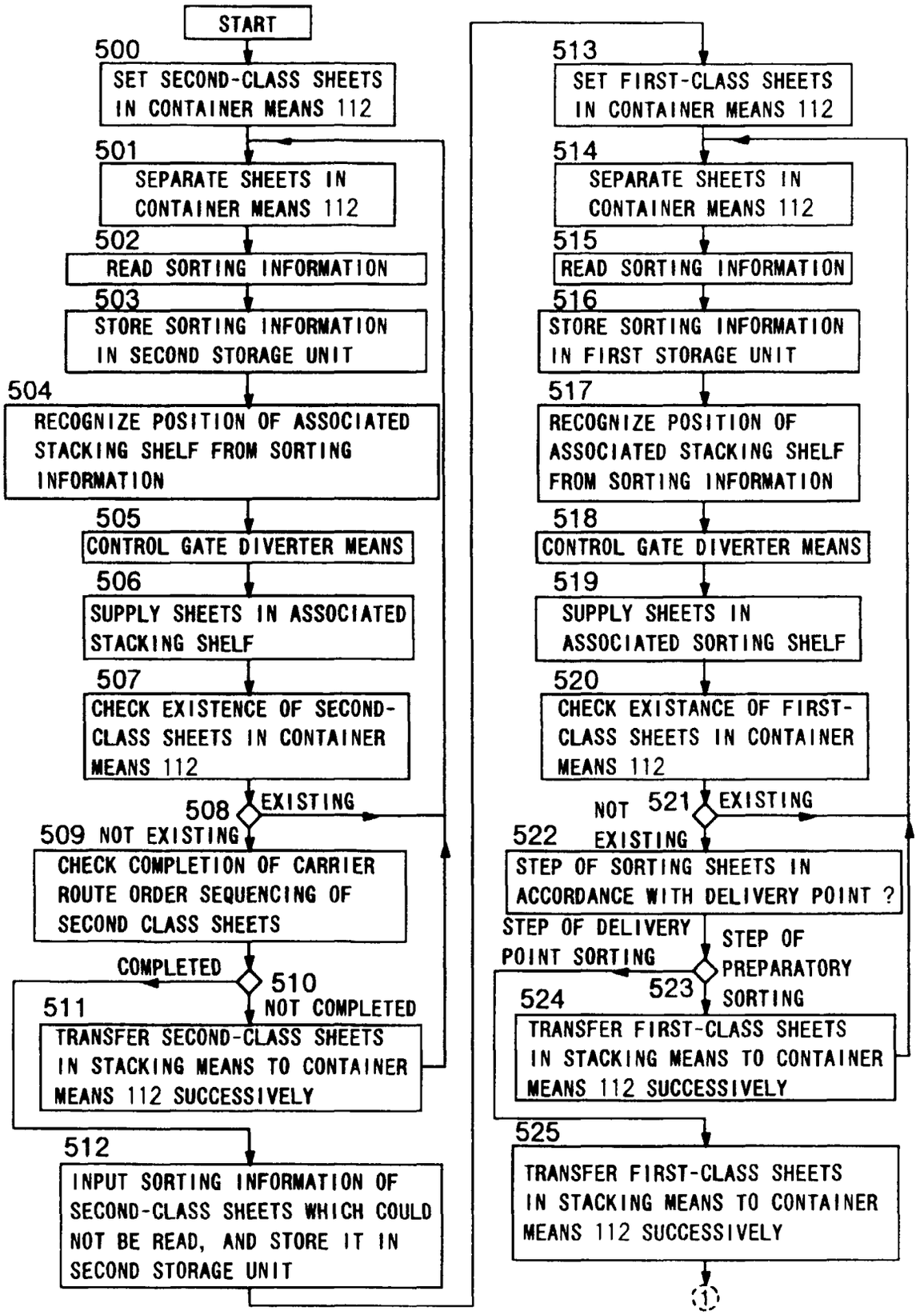

START
500
SET SECOND-CLASS SHEETS IN CONTAINER MEANS 112
501
SEPARATE SHEETS IN CONTAINER MEANS 112
502
READ SORTING INFORMATION
503
STORE SORTING INFORMATION IN SECOND STORAGE UNIT
504
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
505
CONTROL GATE DIVERTER MEANS
506
SUPPLY SHEETS IN ASSOCIATED STACKING SHELF
507
CHECK EXISTENCE OF SECOND-CLASS SHEETS IN CONTAINER MEANS 112
508
EXISTING
509 NOT EXISTING
CHECK COMPLETION OF CARRIER ROUTE ORDER SEQUENCING OF SECOND CLASS SHEETS
COMPLETED
510
NOT COMPLETED
511
TRANSFER SECOND-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
512
INPUT SORTING INFORMATION OF SECOND-CLASS SHEETS WHICH COULD NOT BE READ, AND STORE IT IN SECOND STORAGE UNIT
513
SET FIRST-CLASS SHEETS IN CONTAINER MEANS 112
514
SEPARATE SHEETS IN CONTAINER MEANS 112
515
READ SORTING INFORMATION
516
STORE SORTING INFORMATION IN FIRST STORAGE UNIT
517
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
518
CONTROL GATE DIVERTER MEANS
519
SUPPLY SHEETS IN ASSOCIATED SORTING SHELF
520
CHECK EXISTANCE OF FIRST-CLASS SHEETS IN CONTAINER MEANS 112
521
EXISTING
NOT EXISTING
522
STEP OF SORTING SHEETS IN ACCORDANCE WITH DELIVERY POINT ?
STEP OF DELIVERY POINT SORTING
523
STEP OF PREPARATORY SORTING
524
TRANSFER FIRST-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
525
TRANSFER FIRST-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
(1)

FIG.3

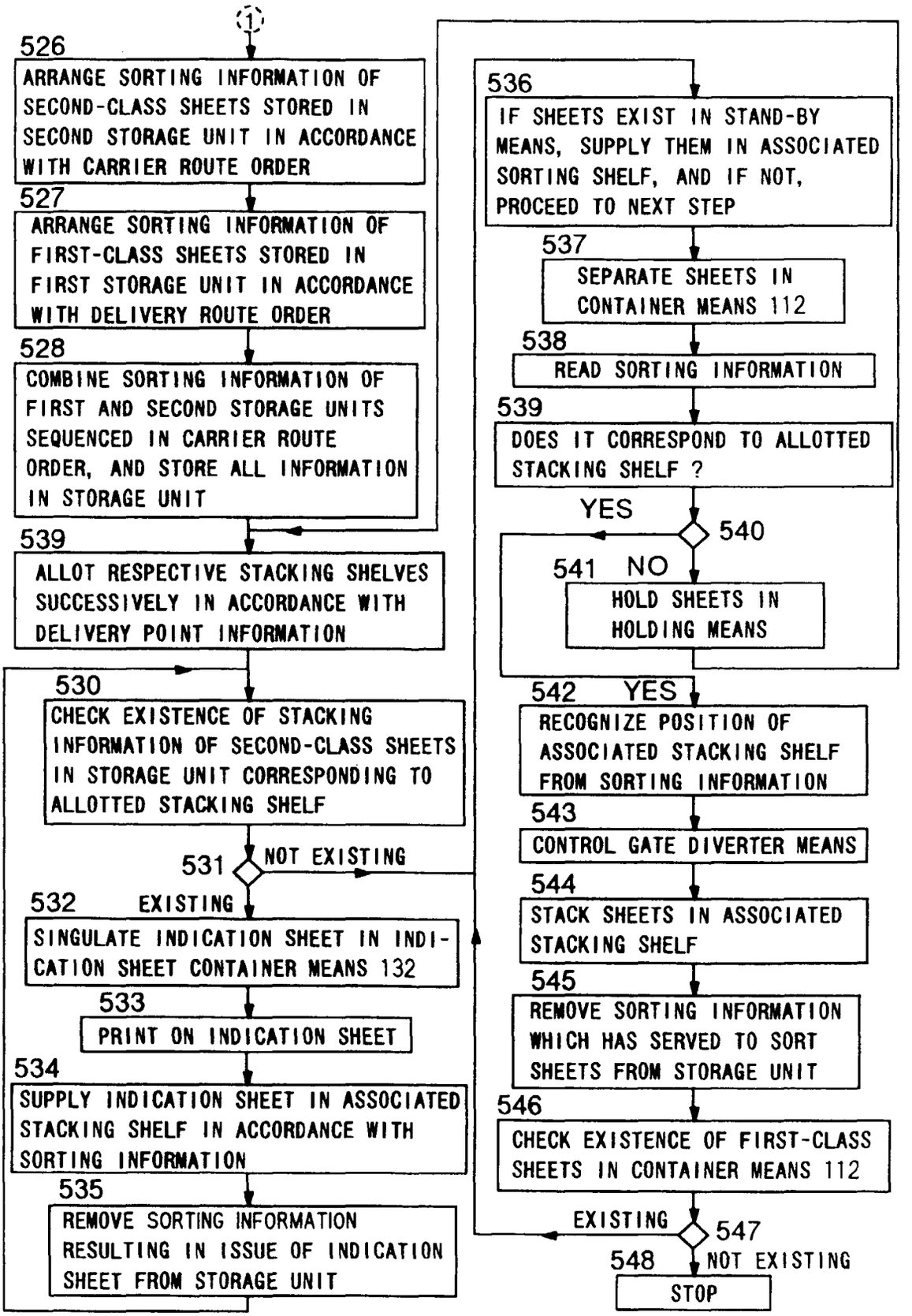

1
526
ARRANGE SORTING INFORMATION OF SECOND-CLASS SHEETS STORED IN SECOND STORAGE UNIT IN ACCORDANCE WITH CARRIER ROUTE ORDER
527
ARRANGE SORTING INFORMATION OF FIRST-CLASS SHEETS STORED IN FIRST STORAGE UNIT IN ACCORDANCE WITH DELIVERY ROUTE ORDER
528
COMBINE SORTING INFORMATION OF FIRST AND SECOND STORAGE UNITS SEQUENCED IN CARRIER ROUTE ORDER, AND STORE ALL INFORMATION IN STORAGE UNIT
539
ALLOT RESPECTIVE STACKING SHELVES SUCCESSIVELY IN ACCORDANCE WITH DELIVERY POINT INFORMATION
530
CHECK EXISTENCE OF STACKING INFORMATION OF SECOND-CLASS SHEETS IN STORAGE UNIT CORRESPONDING TO ALLOTTED STACKING SHELF
531
NOT EXISTING
EXISTING
532
SINGULATE INDICATION SHEET IN INDICATION SHEET CONTAINER MEANS 132
533
PRINT ON INDICATION SHEET
534
SUPPLY INDICATION SHEET IN ASSOCIATED STACKING SHELF IN ACCORDANCE WITH SORTING INFORMATION
535
REMOVE SORTING INFORMATION RESULTING IN ISSUE OF INDICATION SHEET FROM STORAGE UNIT
536
IF SHEETS EXIST IN STAND-BY MEANS, SUPPLY THEM IN ASSOCIATED SORTING SHELF, AND IF NOT, PROCEED TO NEXT STEP
537
SEPARATE SHEETS IN CONTAINER MEANS 112
538
READ SORTING INFORMATION
539
DOES IT CORRESPOND TO ALLOTTED STACKING SHELF ?
YES
540
541
NO
HOLD SHEETS IN HOLDING MEANS
542
YES
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
543
CONTROL GATE DIVERTER MEANS
544
STACK SHEETS IN ASSOCIATED STACKING SHELF
545
REMOVE SORTING INFORMATION WHICH HAS SERVED TO SORT SHEETS FROM STORAGE UNIT
546
CHECK EXISTENCE OF FIRST-CLASS SHEETS IN CONTAINER MEANS 112
EXISTING
547
548
NOT EXISTING
STOP

FIG.4

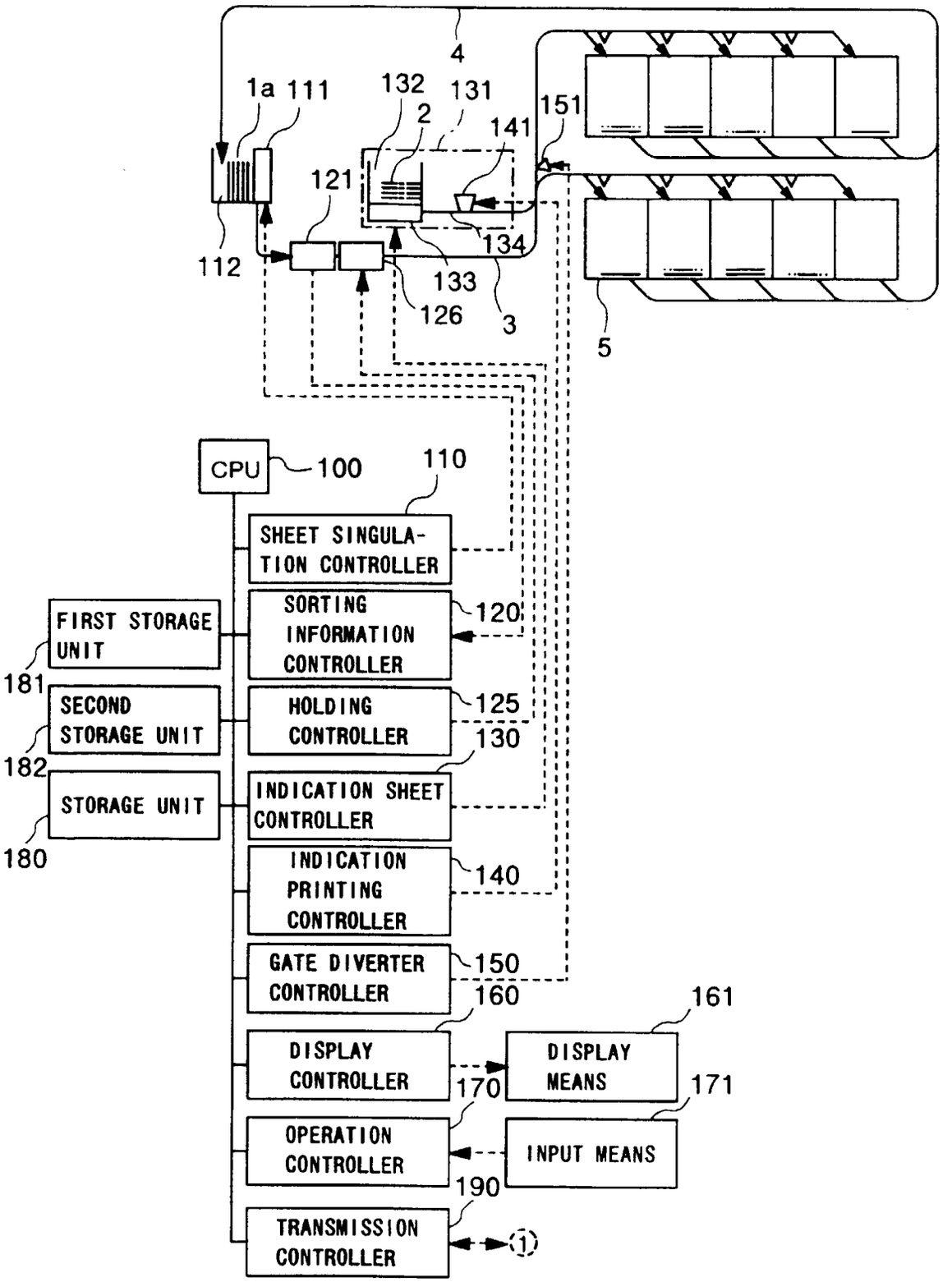

4
1a
111
132
131
2
141
151
121
112
134
133
126
3
5
CPU
100
110
SHEET SINGULATION CONTROLLER
SORTING INFORMATION CONTROLLER
120
FIRST STORAGE UNIT
181
HOLDING CONTROLLER
125
SECOND STORAGE UNIT
182
130
INDICATION SHEET CONTROLLER
STORAGE UNIT
180
INDICATION PRINTING CONTROLLER
140
GATE DIVERTER CONTROLLER
150
160
161
DISPLAY CONTROLLER
DISPLAY MEANS
170
171
OPERATION CONTROLLER
INPUT MEANS
190
TRANSMISSION CONTROLLER
①

FIG.5

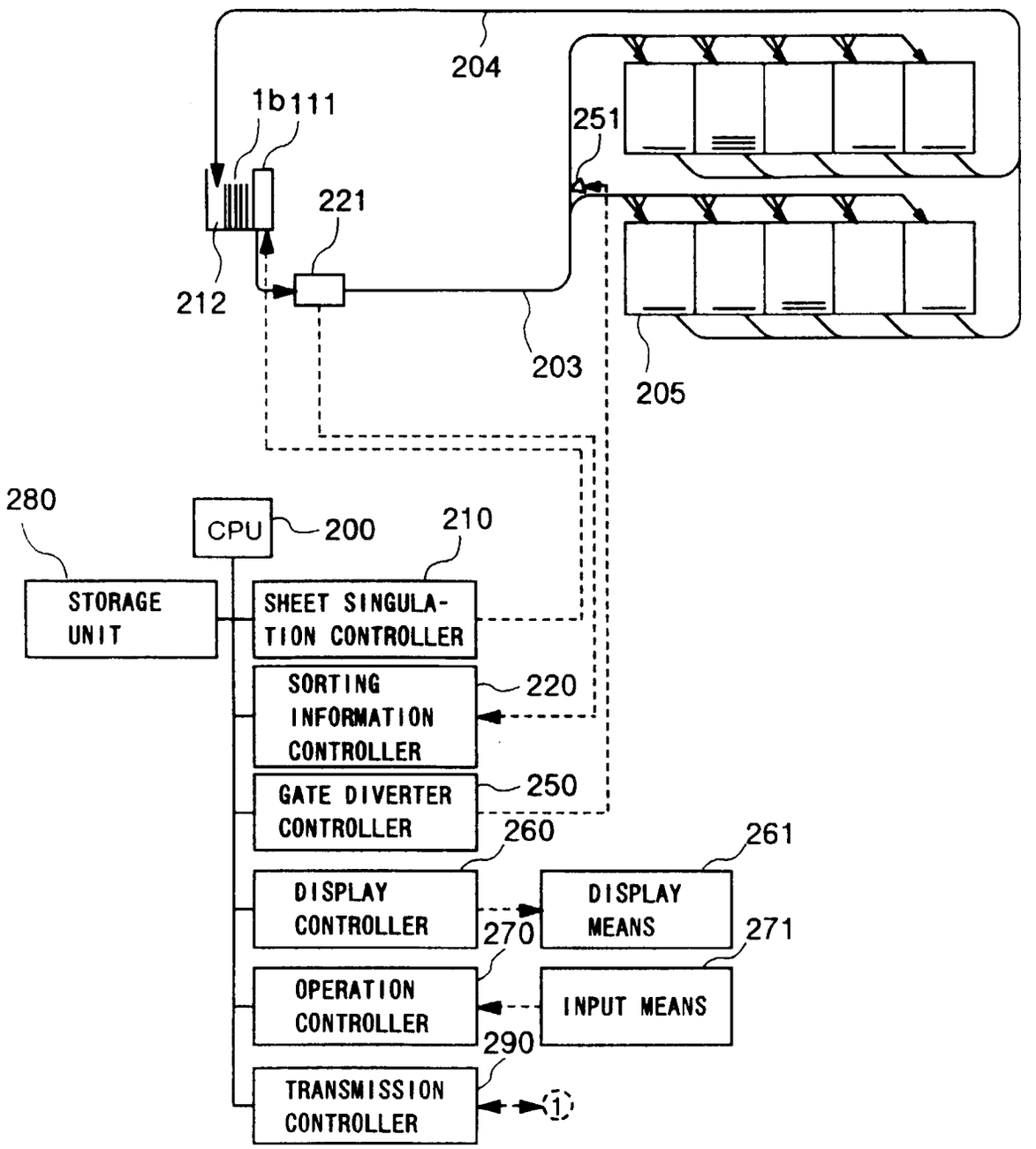

204
1b
111
251
221
212
203
205
280
CPU
200
210
STORAGE UNIT
SHEET SINGULATION CONTROLLER
SORTING INFORMATION CONTROLLER
220
GATE DIVERTER CONTROLLER
250
260
261
DISPLAY CONTROLLER
DISPLAY MEANS
270
271
OPERATION CONTROLLER
INPUT MEANS
290
TRANSMISSION CONTROLLER
1

FIG.6

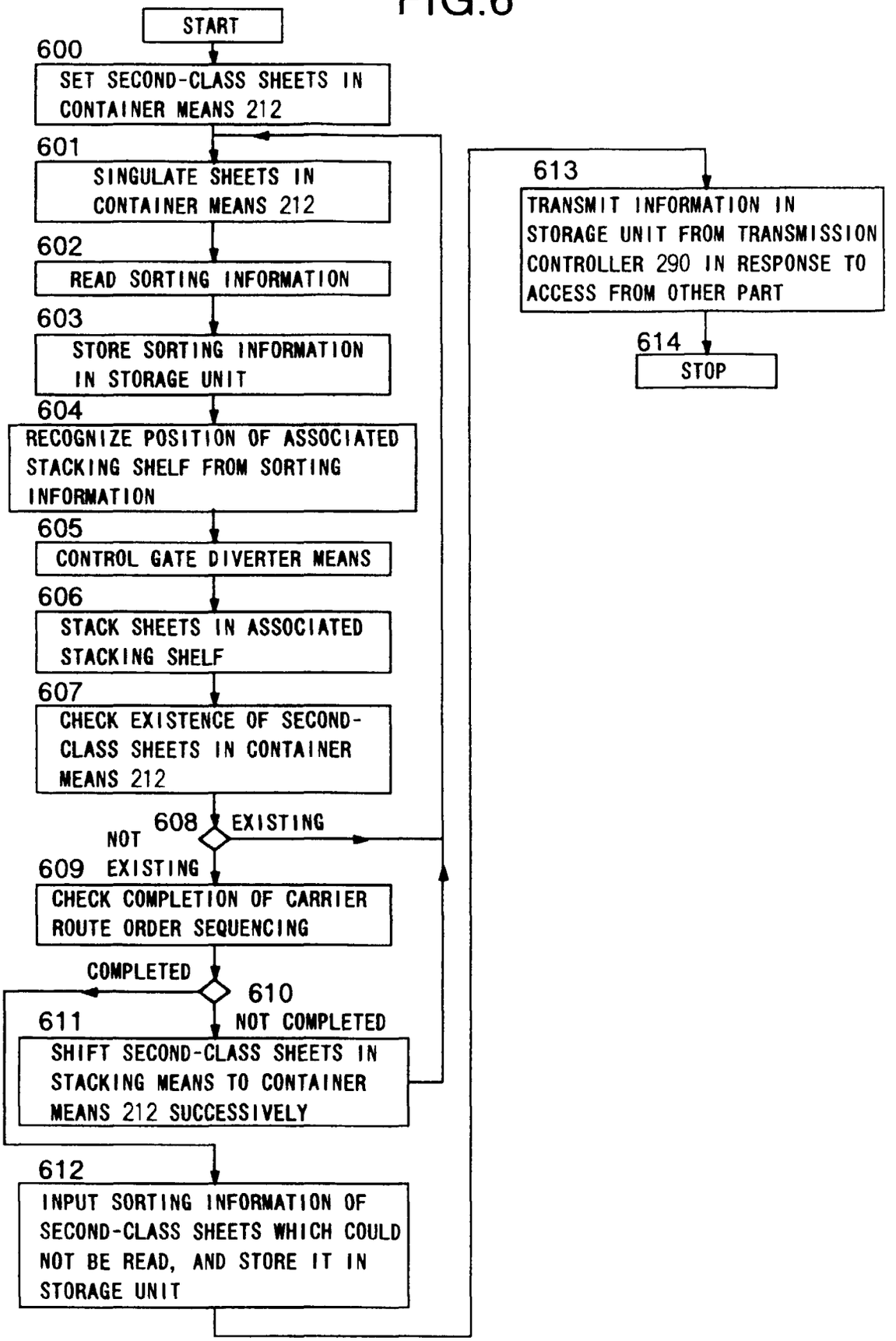

START
600
SET SECOND-CLASS SHEETS IN CONTAINER MEANS 212
601
SINGULATE SHEETS IN CONTAINER MEANS 212
602
READ SORTING INFORMATION
603
STORE SORTING INFORMATION IN STORAGE UNIT
604
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
605
CONTROL GATE DIVERTER MEANS
606
STACK SHEETS IN ASSOCIATED STACKING SHELF
607
CHECK EXISTENCE OF SECOND-CLASS SHEETS IN CONTAINER MEANS 212
608
EXISTING
NOT EXISTING
609
CHECK COMPLETION OF CARRIER ROUTE ORDER SEQUENCING
COMPLETED
610
NOT COMPLETED
611
SHIFT SECOND-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 212 SUCCESSIVELY
612
INPUT SORTING INFORMATION OF SECOND-CLASS SHEETS WHICH COULD NOT BE READ, AND STORE IT IN STORAGE UNIT
613
TRANSMIT INFORMATION IN STORAGE UNIT FROM TRANSMISSION CONTROLLER 290 IN RESPONSE TO ACCESS FROM OTHER PART
614
STOP

FIG.7

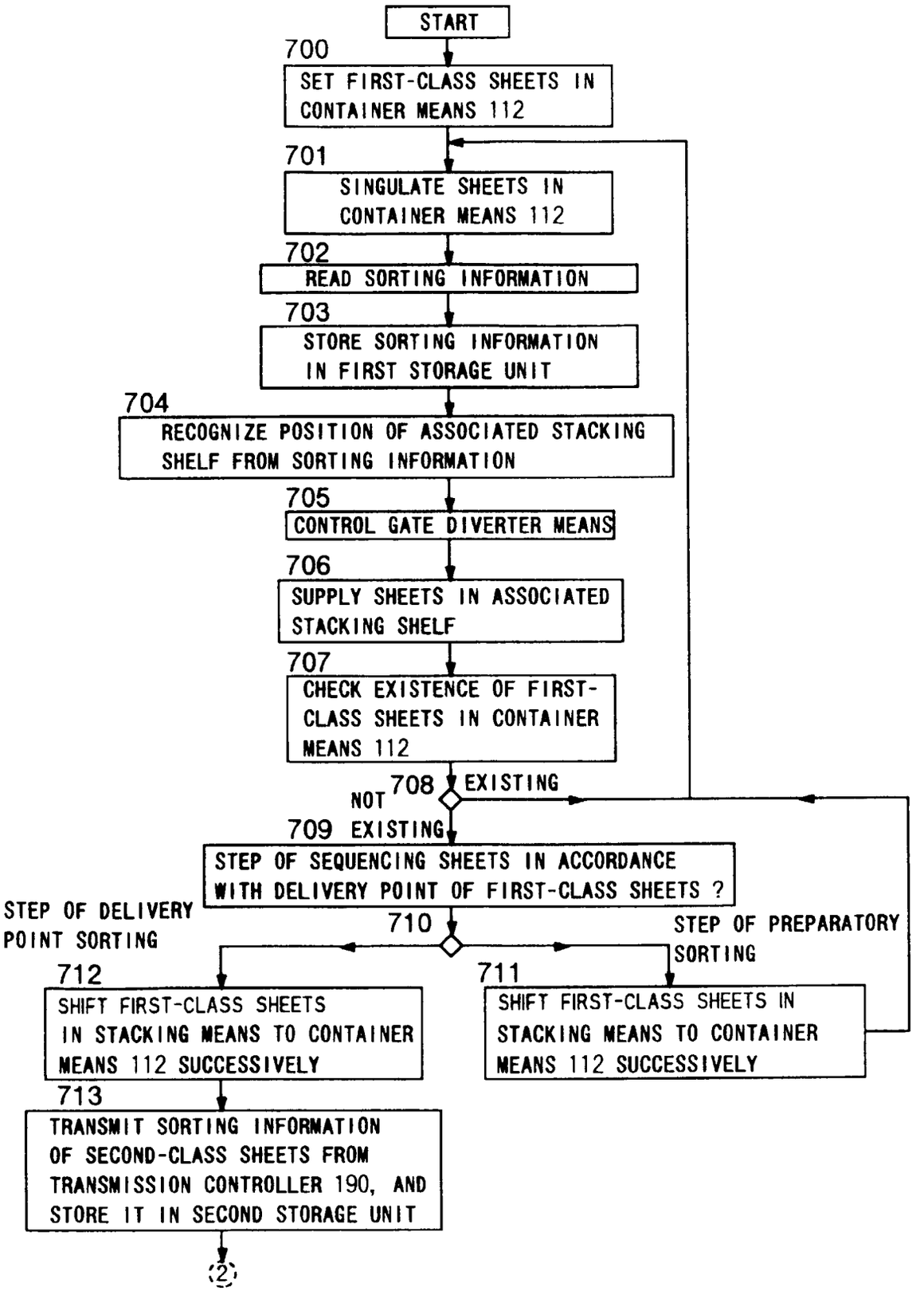

START
700
SET FIRST-CLASS SHEETS IN CONTAINER MEANS 112
701
SINGULATE SHEETS IN CONTAINER MEANS 112
702
READ SORTING INFORMATION
703
STORE SORTING INFORMATION IN FIRST STORAGE UNIT
704
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
705
CONTROL GATE DIVERTER MEANS
706
SUPPLY SHEETS IN ASSOCIATED STACKING SHELF
707
CHECK EXISTENCE OF FIRST-CLASS SHEETS IN CONTAINER MEANS 112
708
EXISTING
NOT EXISTING
709
STEP OF SEQUENCING SHEETS IN ACCORDANCE WITH DELIVERY POINT OF FIRST-CLASS SHEETS ?
710
STEP OF DELIVERY POINT SORTING
STEP OF PREPARATORY SORTING
712
SHIFT FIRST-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
711
SHIFT FIRST-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
713
TRANSMIT SORTING INFORMATION OF SECOND-CLASS SHEETS FROM TRANSMISSION CONTROLLER 190, AND STORE IT IN SECOND STORAGE UNIT
②

FIG.8

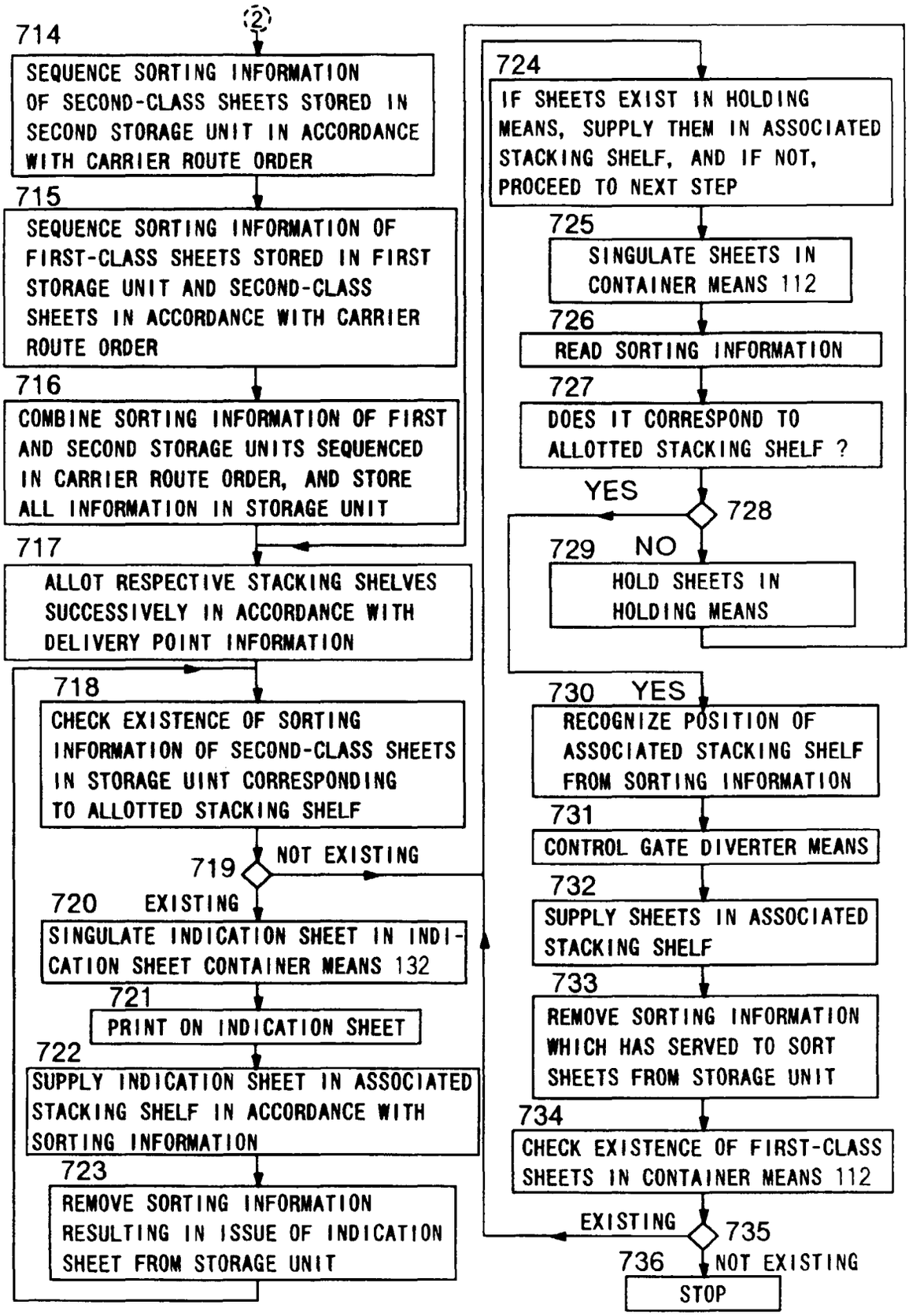

(2)
714
SEQUENCE SORTING INFORMATION OF SECOND-CLASS SHEETS STORED IN SECOND STORAGE UNIT IN ACCORDANCE WITH CARRIER ROUTE ORDER
715
SEQUENCE SORTING INFORMATION OF FIRST-CLASS SHEETS STORED IN FIRST STORAGE UNIT AND SECOND-CLASS SHEETS IN ACCORDANCE WITH CARRIER ROUTE ORDER
716
COMBINE SORTING INFORMATION OF FIRST AND SECOND STORAGE UNITS SEQUENCED IN CARRIER ROUTE ORDER, AND STORE ALL INFORMATION IN STORAGE UNIT
717
ALLOT RESPECTIVE STACKING SHELVES SUCCESSIVELY IN ACCORDANCE WITH DELIVERY POINT INFORMATION
718
CHECK EXISTENCE OF SORTING INFORMATION OF SECOND-CLASS SHEETS IN STORAGE UINT CORRESPONDING TO ALLOTTED STACKING SHELF
719
NOT EXISTING
720
EXISTING
SINGULATE INDICATION SHEET IN INDICATION SHEET CONTAINER MEANS 132
721
PRINT ON INDICATION SHEET
722
SUPPLY INDICATION SHEET IN ASSOCIATED STACKING SHELF IN ACCORDANCE WITH SORTING INFORMATION
723
REMOVE SORTING INFORMATION RESULTING IN ISSUE OF INDICATION SHEET FROM STORAGE UNIT
724
IF SHEETS EXIST IN HOLDING MEANS, SUPPLY THEM IN ASSOCIATED STACKING SHELF, AND IF NOT, PROCEED TO NEXT STEP
725
SINGULATE SHEETS IN CONTAINER MEANS 112
726
READ SORTING INFORMATION
727
DOES IT CORRESPOND TO ALLOTTED STACKING SHELF ?
YES
728
729
NO
HOLD SHEETS IN HOLDING MEANS
730
YES
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
731
CONTROL GATE DIVERTER MEANS
732
SUPPLY SHEETS IN ASSOCIATED STACKING SHELF
733
REMOVE SORTING INFORMATION WHICH HAS SERVED TO SORT SHEETS FROM STORAGE UNIT
734
CHECK EXISTENCE OF FIRST-CLASS SHEETS IN CONTAINER MEANS 112
EXISTING
735
736
NOT EXISTING
STOP

FIG.9

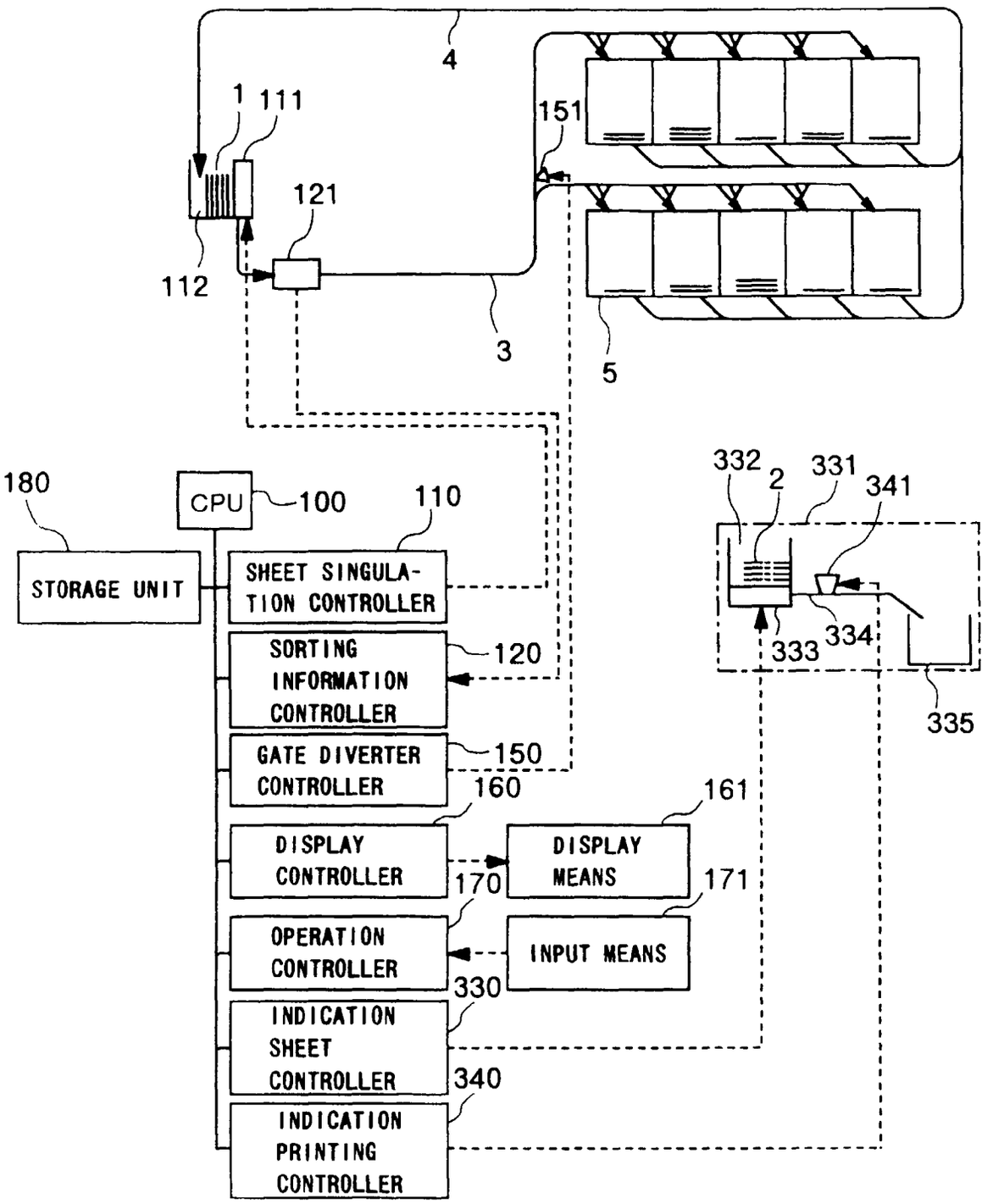

4
1
111
151
121
112
3
5
180
CPU
100
110
STORAGE UNIT
SHEET SINGULA-TION CONTROLLER
SORTING INFORMATION CONTROLLER
120
GATE DIVERTER CONTROLLER
150
160
161
DISPLAY CONTROLLER
DISPLAY MEANS
170
171
OPERATION CONTROLLER
INPUT MEANS
330
INDICATION SHEET CONTROLLER
340
INDICATION PRINTING CONTROLLER
332
2
331
341
333
334
335

FIG.10

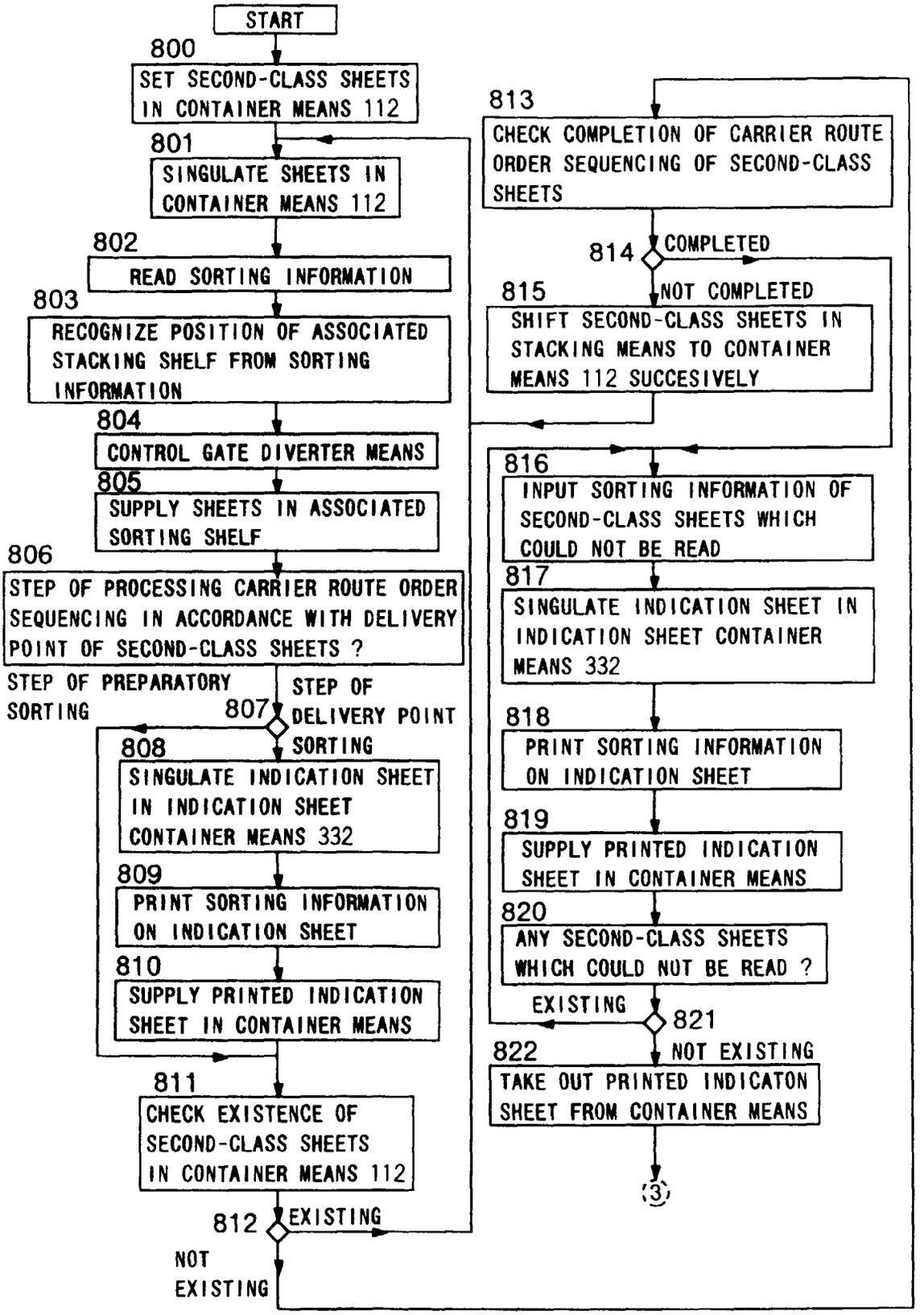
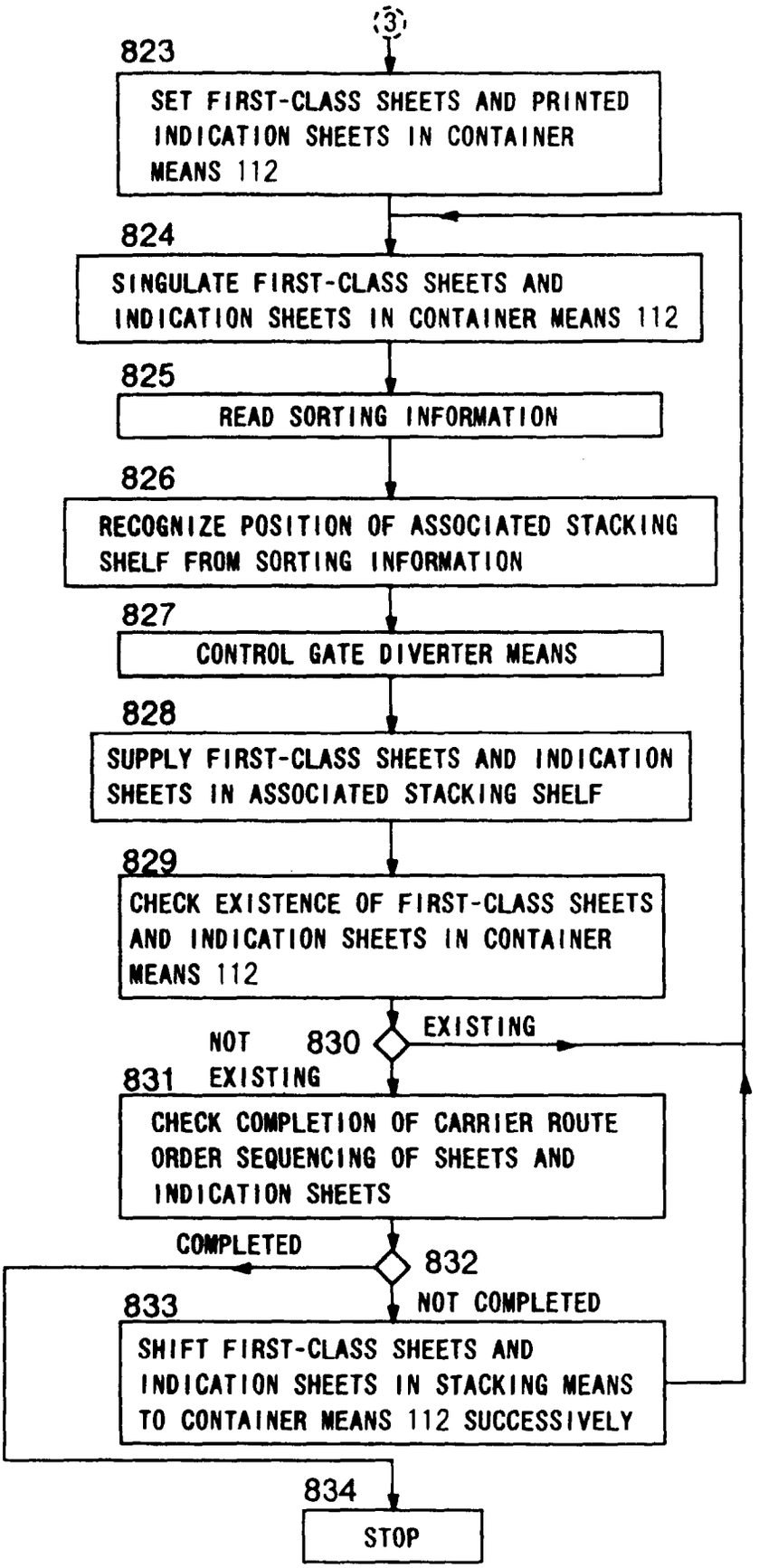

START
800
SET SECOND-CLASS SHEETS IN CONTAINER MEANS 112
801
SINGULATE SHEETS IN CONTAINER MEANS 112
802
READ SORTING INFORMATION
803
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
804
CONTROL GATE DIVERTER MEANS
805
SUPPLY SHEETS IN ASSOCIATED SORTING SHELF
806
STEP OF PROCESSING CARRIER ROUTE ORDER SEQUENCING IN ACCORDANCE WITH DELIVERY POINT OF SECOND-CLASS SHEETS ?
STEP OF PREPARATORY SORTING
807
STEP OF DELIVERY POINT SORTING
808
SINGULATE INDICATION SHEET IN INDICATION SHEET CONTAINER MEANS 332
809
PRINT SORTING INFORMATION ON INDICATION SHEET
810
SUPPLY PRINTED INDICATION SHEET IN CONTAINER MEANS
811
CHECK EXISTENCE OF SECOND-CLASS SHEETS IN CONTAINER MEANS 112
812
EXISTING
NOT EXISTING
813
CHECK COMPLETION OF CARRIER ROUTE ORDER SEQUENCING OF SECOND-CLASS SHEETS
814
COMPLETED
815
NOT COMPLETED
SHIFT SECOND-CLASS SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESIVELY
816
INPUT SORTING INFORMATION OF SECOND-CLASS SHEETS WHICH COULD NOT BE READ
817
SINGULATE INDICATION SHEET IN INDICATION SHEET CONTAINER MEANS 332
818
PRINT SORTING INFORMATION ON INDICATION SHEET
819
SUPPLY PRINTED INDICATION SHEET IN CONTAINER MEANS
820
ANY SECOND-CLASS SHEETS WHICH COULD NOT BE READ ?
EXISTING
821
NOT EXISTING
822
TAKE OUT PRINTED INDICATON SHEET FROM CONTAINER MEANS
③

FIG.11


3
823
SET FIRST-CLASS SHEETS AND PRINTED INDICATION SHEETS IN CONTAINER MEANS 112
824
SINGULATE FIRST-CLASS SHEETS AND INDICATION SHEETS IN CONTAINER MEANS 112
825
READ SORTING INFORMATION
826
RECOGNIZE POSITION OF ASSOCIATED STACKING SHELF FROM SORTING INFORMATION
827
CONTROL GATE DIVERTER MEANS
828
SUPPLY FIRST-CLASS SHEETS AND INDICATION SHEETS IN ASSOCIATED STACKING SHELF
829
CHECK EXISTENCE OF FIRST-CLASS SHEETS AND INDICATION SHEETS IN CONTAINER MEANS 112
EXISTING
NOT EXISTING
830
831
CHECK COMPLETION OF CARRIER ROUTE ORDER SEQUENCING OF SHEETS AND INDICATION SHEETS
COMPLETED
832
NOT COMPLETED
833
SHIFT FIRST-CLASS SHEETS AND INDICATION SHEETS IN STACKING MEANS TO CONTAINER MEANS 112 SUCCESSIVELY
834
STOP