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

(11) **EP 3 750 521 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
16.12.2020 Bulletin 2020/51

(21) Application number: **18905390.3**

(22) Date of filing: **27.12.2018**

(51) Int Cl.:
A61J 3/00 *(2006.01)*

(86) International application number:
PCT/JP2018/048330

(87) International publication number:
WO 2019/155788 (15.08.2019 Gazette 2019/33)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **09.02.2018 JP 2018022236**

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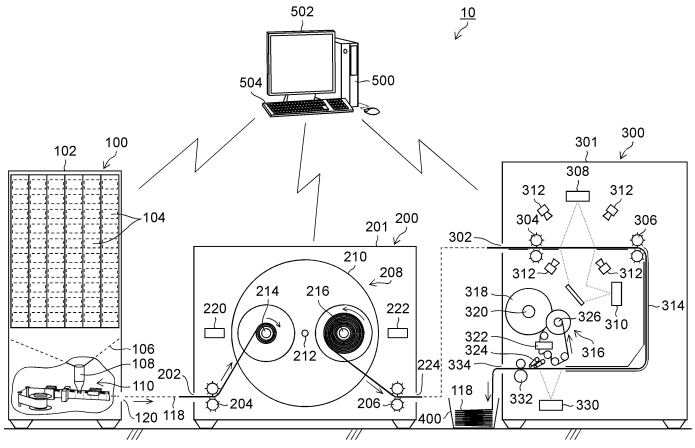
(54) MEDICATION AUDITING SUPPORT SYSTEM

(57) There is provided a medication auditing support system capable of adjusting a difference between processing speeds of a dose-packaging machine and an auditing machine. A medication auditing support system 10 is provided with: a dose-packaging machine 100 configured to package medication based on prescription data and discharge continuous packaging sachets; a conveying machine 200 configured to receive the continuous packaging sachets 118 discharged from the dose-packaging machine 100 and feed the continuous packaging sachets 118; an auditing machine 300 configured to receive the continuous packaging sachets 118 fed from the conveying machine 200 and audit the medication packaged in the packaging sachets 118 based on the prescription data; and a controlling machine configured to control the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300. The conveying machine 200 is provided with a turret mechanism 208 as a buffer unit.

FIG.1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a medication auditing support system provided with a dose-packaging machine and an auditing machine.

Description of the Related Art

[0002] Recently, in hospitals, pharmacies and the like, a dose-packaging machine and an auditing machine have been introduced. The dose-packaging machine automates packaging work to put medication into packaging sachets based on prescription data. Further, the auditing machine automates auditing work to check whether the medications are put in packaging sachets according to the prescription data or not.

[0003] In Japanese Patent Application Laid-Open No. 2017-209499 (hereinafter referred to as "PTL 1") discloses: a packaged medication dispensing part having a discharging unit; a post-process part having a conveying unit and a packaged medication inspecting part; and a controlling part. The controlling part associates a conveyance speed of the conveying unit and a discharge speed of the discharging unit, and controls at least one of the conveying unit and the discharging unit so that a post-process is performed without a bundle of packaged medications being damaged.

Citation List

[0004] Patent Literature1: Japanese Patent Application Laid-Open No. 2017-209499

SUMMARY OF THE INVENTION

[0005] However, even when the conveyance speed of the conveying unit and the discharge speed of the discharging unit are associated, there is a concern that, in a case where a difference between the conveyance speed and the discharge speed is large and the like, the difference in speed cannot be absorbed.

[0006] The present invention has been made in consideration of such a situation, and aims to provide a medication auditing support system capable of adjusting a difference between processing speeds of a dose-packaging machine and an auditing machine.

[0007] A medication auditing support system of a first aspect is provided with: a dose-packaging machine configured to package medication based on prescription data and discharge continuous packaging sachets; a conveying machine configured to receive the continuous packaging sachets discharged from the dose-packaging machine and feed the continuous packaging sachets in a length direction; an auditing machine configured to receive the continuous packaging sachets fed from the conveying machine and audit the medication packaged in the packaging sachets based on the prescription data; and a controlling machine configured to control the dose-packaging machine, the conveying machine and the auditing machine; and the conveying machine is provided with a buffer unit configured to store the continuous packaging sachets.

[0008] In a medication auditing support system of a second aspect, when an amount of the packaging sachets stored in the buffer unit reaches a maximum permissible range, the controlling machine temporarily stops an operation of the dose-packaging machine.

[0009] In a medication auditing support system of a third aspect, the buffer unit includes a dancer roller mechanism.

[0010] In a medication auditing support system of a fourth aspect, the buffer unit includes a turret mechanism having a plurality of rotating shafts and configured to switch positions of the plurality of rotating shafts, the turret mechanism being configured to wind a part of the packaging sachets discharged from the dose-packaging machine by one of the rotating shafts and feed another part of the packaging sachets to the auditing machine by another one of the rotating shafts.

[0011] In a medication auditing support system of a fifth aspect, the conveying machine receives the packaging sachets in synchronization with discharge of the packaging sachets from the dose-packaging machine.

[0012] In a medication auditing support system of a sixth aspect, the conveying machine imparts certain tension to the continuous packaging sachets and receives only the packaging sachets discharged from the dose-packaging machine.

[0013] In a medication auditing support system of a seventh aspect, a detector configured to detect a movement of one of the continuous packaging sachets discharged from the dose-packaging machine is provided, and the conveying machine receives the one of the packaging sachets based on a result of the detector.

[0014] In a medication auditing support system of an eighth aspect, the controlling machine instructs the dose-packaging machine to package the medication based on an audit result of the auditing machine.

[0015] In a medication auditing support system of a ninth aspect, a perforation forming machine configured to form perforations on the continuous packaging sachets that have been audited by the auditing machine is provided.

[0016] In a medication auditing support system of a tenth aspect, the dose-packaging machine is provided with a switching mechanism configured to switch between a route to feed the packaging sachets to the auditing machine and a route to feed the packaging sachets to a place other than the auditing machine.

[0017] According to the present invention, since a buffer unit is provided, it is possible to adjust a difference between processing speeds of a dose-packaging ma-

chine and an auditing machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Figure 1 is a schematic diagram showing a configuration of a medication auditing support system according to a first embodiment.
Figure 2 is a block diagram showing the configuration of the medication auditing support system.
Figure 3 is an enlarged diagram of a packaging mechanism provided in a dose-packaging machine.
Figure 4 is a block diagram of a controlling machine.
Figure 5 is a partially enlarged diagram of an auditing machine.
Figure 6 is a partially enlarged diagram of the dose-packaging machine and the auditing machine.
Figure 7 is a schematic configuration diagram of a conveying machine according to a second embodiment.
Figure 8 is a schematic configuration diagram of a conveying machine according to a modification of the second embodiment.
Figure 9 is an explanatory diagram showing an operation according to the modification of the second embodiment.
Figure 10 is an explanatory diagram showing another operation according to the modification of the second embodiment.
Figure 11 is an explanatory diagram showing another operation according to a modification of a third embodiment.

DESCRIPTION OF EMBODIMENTS

[0019] Preferable embodiments of the present invention are described below according to accompanying drawings. The present invention is described by the preferable embodiments below. It is possible to make changes by many methods without departing from the scope of the present invention, and it is possible to use embodiments other than the embodiments described herein. Therefore, the claims include all the changes which fall within the scope of the present invention.

[0020] Here, components designated by the same reference numeral are similar components having similar functions in the figures. When a numerical range is represented with "_ to _", it means that the upper limit numeric value and the lower limit numeric value represented by "_ to _" are included in the numerical range in the specification.

[First embodiment]

[0021] Medication prescribing work performed in hospitals, pharmacies and the like includes prescription data inputting work, picking work, automatic packaging work, dispensing auditing work, and administration guiding and prescribing work, when being roughly classified. In the administration guiding and prescribing work, a pharmacist performs administration guidance to a patient, and prescribes packaged medication, after the dispensing auditing work.

[0022] In the prescription data inputting work, the pharmacist inputs the prescription data written on a medical prescription to a receipt computer (not shown). The prescription data includes, for example, a patient's name and age, a medication type of a medication or a name of the medication, an amount of the medication, usage of the medication, or a dose of the medication and the like. The term medication type of a medication in the present specification is synonymous with a classification of the medication or a kind of the medication.

[0023] Next, the pharmacist operates the receipt computer to print the prescription data from a printer connected to the receipt computer.

[0024] In the picking work, based on the prescription data written on a printed matter outputted from the printer, the pharmacist picks a medication corresponding to the prescription data from a medication shelf. The medication includes, for example, tablets, capsules and the like. Here, in the picking work, for example, an automatic picking device configured to automatically pick the medication based on the prescription data inputted to the receipt computer may be used.

[0025] Figure 1 is a schematic configuration diagram of a medication auditing support system. As shown in Figure 1, a medication auditing support system 10 is provided with: a dose-packaging machine 100; a conveying machine 200; an auditing machine 300; and a controlling machine 500 configured to control the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300.

[0026] In the present specification, "up/upward" and "down/downward" indicating directions, respectively mean "up/upward" and "down/downward" when the medication auditing support system is installed in a normal use state. In addition, as to "vertical (longitudinal)" and "horizontal (lateral)", with reference to a folded portion of a long (continuous) packaging paper, respectively mean a direction orthogonal to the folded portion and a direction parallel to the folded portion. "Orthogonal" includes "substantially orthogonal", and "parallel" includes "substantially parallel". Further, as to "upstream" and "downstream", with regard to a conveyance direction of packaging paper or packaging sachets (packaging sachets), a conveyance destination direction side relative to a certain reference means "downstream", and a side opposite to the conveyance destination direction means "upstream".

<Controlling machine>

[0027] As the controlling machine 500, for example, a personal computer is given. Prescription data is inputted

to the controlling machine 500 from a receipt computer online. The controlling machine 500 is provided, for example, with a displaying unit 502 having a display device and an operating unit 504 having a keyboard.

[0028] Figure 2 is a block diagram showing the configuration of the medication auditing support system 10. As shown in Figure 2, the controlling machine 500 is electrically connected to the dose-packaging machine 100, the conveying machine 200, the auditing machine 300, the displaying unit 502 and the operating unit 504. The controlling machine 500 includes: a processing unit 506 configured to perform various kinds of controls; a storing unit 508 configured to store various kinds of data; and a communication interface 510 configured to perform data communication with an external network. The controlling machine 500 is connected to the receipt computer via the communication interface 510.

<Dose-packaging machine>

[0029] As shown in Figure 1, the dose-packaging machine 100 has a casing 102. The dose-packaging machine 100 is provided with a plurality of feeders 104 for storing a plurality of medications. The plurality of feeders 104 are arranged in a vertical direction (longitudinal direction) and in a horizontal direction (lateral direction). The plurality of feeders 104 can be arranged on a back side when seen from a front. The feeders 104 can drop the medications stored therein one by one, to the lower side.

[0030] The controlling machine 500 can select necessary feeders 104 based on prescription data and cause the feeders to drop stored medication to the lower side from the feeder 104. Medication corresponding to one sachet is dropped to the lower side. Each feeder 104 can include: a cassette configured to accommodate medication; and a shooter or the like configured to guide the medication from the cassette to the lower side.

[0031] The dose-packaging machine 100 is provided with a hopper 106 on the lower side of the feeders 104. The hopper 106 is a tubular member having openings on both sides. The opening on the upper side is wide, and the opening on the lower side is narrower than the upper-side opening. The hopper 106 collects medication dropped from feeders 104 on the upper side thereof and gathers the medication in one place on the lower side thereof. A feeding pipe 108 is provided on the lower side of the hopper 106.

[0032] The dose-packaging machine 100 has a packaging mechanism 110 on the lower side of the feeding pipe 108. Tablets gathered by the hopper 106 are guided to the packaging mechanism 110 by the feeding pipe 108. The feeding pipe 108 is a tube-shaped member that extends in a vertical direction. A cross-section of the feeding pipe 108 may be in a circular shape or in an oval shape. Further, the feeding pipe 108 may be in a cylindrical shape or in a frustum shape. The shape of the feeding pipe 108 is not especially limited so long as the feeding pipe 108 can guide tablets to the packaging mechanism 110.

[0033] As shown in Figure 3, the packaging mechanism 110 is provided with a supplying mechanism 114 configured to feed packaging paper 112 and a heat sealing mechanism 116 configured to heat-fuse the packaging paper 112. The packaging paper 112 is formed of a heat fusible material. The packaging paper 112 is in a state where a continuous sheet is two-folded in a lateral direction, and then wound in a roll shape.

[0034] The heat sealing mechanism 116 has, for example, a vertical heating head (longitudinal heating head) 116A that is vertically (longitudinally) arranged and a horizontal heating head (lateral heating head) 116B that is horizontally (laterally) arranged. The heat sealing mechanism 116 can form vertical seal portions (longitudinal seal portions) and horizontal seal portions (lateral seal portions) on the packaging paper 112 that is being conveyed.

[0035] The supplying mechanism 114 includes, for example, a shaft configured to hold the packaging paper 112 in a roll shape, a drive motor configured to rotate the shaft and the like. The controlling machine 500 can intermittently or continuously drive the drive motor to rotate.

[0036] The packaging paper 112 is conveyed in a state in which the folded portion is located on the lower side. For example, the vertical seal portion is formed on the packaging paper 112 by the vertical heating head 116A of the heat sealing mechanism 116. The packaging paper 112 is in a state of being half closed. Then, the half-closed packaging paper 112 passes below the feeding pipe 108. Medication corresponding to one sachet is supplied to the half-closed packaging paper 112 from the feeding pipe 108. Then, the horizontal seal portion is formed by the horizontal heating head 116B of the heat sealing mechanism 116. Thereby, the heat sealing mechanism 116 heat fuses packaging paper 112 to form packaging sachets 118 which individually packages the medication. The dose-packaging machine 100 discharges continuous packaging sachets 118 from a discharge port 120.

[0037] The vertical heating head 116A of the heat sealing mechanism 116 may be provided with a perforation forming machine (not shown). The perforation forming machine is provided, for example, with a plurality of blades or the like capable of penetrating the packaging paper 112. When the vertical heating head 116A heat-fuses the packaging paper 112 from both sides, the perforation forming machine can form perforations on the vertical seal portion. By cutting off the continuous packaging sachets 118 along the perforations, the continuous packaging sachets 118 are separated into individual packaging sachets 118.

[0038] The packaging mechanism 110 may include a print head 122. The print head 122 performs printing on an area in the packaging paper 112 where packaging sachets are formed, after the packaging paper 112 passes through the heat sealing mechanism 116. Printed information includes, for example, a patient's name, a

name and usage of the medication, and the like.

<Auditing machine>

[0039] The auditing machine 300 has a casing 301. The casing 301 is provided with an introduction port 302 configured to receive the continuous packaging sachets 118 and a discharge port 334 configured to discharge the continuous packaging sachets 118. The auditing machine 300 is provided with a pair of first conveying rollers 304 on the upstream side and a pair of second conveying rollers 306 on the downstream side. The first conveying rollers 304 and the second conveying rollers 306 sandwich (hold therebetween) the horizontal seal portions of the continuous packaging sachets 118 from upward and downward directions. By sandwiching the horizontal seal portions, it is possible to avoid medication from being caught between the first conveying rollers 304 and the second conveying rollers 306 so that the medication is not damaged.

[0040] An imaging area is provided on a conveying path between the first conveying rollers 304 and the second conveying rollers 306. In the imaging area, a first camera 308 is arranged on the upper side of the conveying path, and a second camera 310 is arranged on the lower side of the conveying path. The first camera 308 and the second camera 310 are, for example, digital cameras.

[0041] A plurality of light sources 312 are arranged on the upper and lower sides of the conveying path. On the upper side of the conveying path, four light sources 312 are arranged at equal intervals on the same circumference around an imaging optical axis of the first camera 308. Similarly, on the lower side of the conveying path, four light sources 312 are arranged at equal intervals on the same circumference around an imaging optical axis of the second camera 310.

[0042] The imaging area of the conveying path is formed of a transparent member. The first camera 308 and the second camera 310 image medications packaged in each conveyed packaging sachet 118 from the upward and downward directions. In the imaging area, the packaging sachet 118 is in a horizontal state. The horizontal state means that a plane surrounded by the vertical seal portions, horizontal seal portions and folded portion of each packaging sachet 118 is horizontal.

[0043] It is preferable that a spreading mechanism (not shown) is provided in the imaging area. The spreading mechanism eliminates overlap among medications in each packaging sachet 118. By causing the spreading mechanism to operate, the first camera 308 and the second camera 310 can accurately image the medications in each packaging sachet 118.

[0044] A guide 314 is arranged downstream of the imaging area. The guide 314 guides the packaging sachets 118 to the conveying path on the lower side.

[0045] The auditing machine 300 is provided with a label printer mechanism 316. A third camera 330 is arranged at a position facing the label printer mechanism 316, with the conveying path interposed between the third camera 330 and the label printer mechanism 316. The third camera 330 images perforations formed on the vertical seal portions of each packaging sachet 118 to detect positions of the perforations. Positions where labels are attached are adjusted based on the detected positions of the perforations.

[0046] The label printer mechanism 316 includes: a supplying mechanism 320 configured to feed labeled backing paper 318; a label printer 322; a label peeling mechanism 324; and a winding mechanism 326 configured to wind the backing paper. The supplying mechanism 320 includes, for example, a shaft configured to hold the labeled backing paper 318 in a roll shape, a drive motor configured to rotate the shaft, and the like. The label printer 322 includes, for example, a thermal head printer. The winding mechanism 326 includes a shaft configured to wind the backing paper 318 that is unlabeled, a drive motor configured to rotate the shaft, and the like. The label peeling mechanism 324 includes a pair of belt conveying mechanisms. The labeled backing paper 318 is caused to pass through between the pair of belt conveying mechanisms and folded so as to peel a printed label from the backing paper. The peeled label is attached to the packaging sachet 118.

[0047] The print head 122 of the packaging mechanism 110 and the label printer mechanism 316 of the auditing machine 300 can be used in parallel with each other, or only one of the print head 122 and print head 122 can be used.

[0048] A pair of third conveying rollers 332 is arranged downstream of the label printer mechanism 316. The third conveying rollers 332 discharge the continuous packaging sachets 118 to which the labels are attached, from the discharge port 334. The packaging sachets 118 discharged from the discharge port 334 are accommodated into an accommodation box 400. Though the accommodation box 400 is shown in the embodiment, a winding device may be arranged instead of the accommodation box 400. The winding device includes a winding shaft, a drive motor configured to drive the winding shaft, and the like.

<Conveying machine>

[0049] The conveying machine 200 has a casing 201. The casing 201 is provided with an introduction port 202 configured to receive the continuous packaging sachets 118 and a discharge port 224 configured to discharge the continuous packaging sachets 118. The conveying machine 200 is provided with a pair of first conveying rollers 204, a turret mechanism 208 and a pair of second conveying rollers 206 in this order from the upstream side toward the downstream side.

[0050] The turret mechanism 208 is provided with a disk-shaped turn table 210, and a table rotating shaft 212 configured to rotatably support the turn table 210. The

table rotating shaft 212 is connected to a drive motor (not shown).

[0051] As shown in Figure 1, the turn table 210 is provided with a plurality of rotating shafts (a winding rotating shaft 214 and a feeding rotating shaft 216). The winding rotating shaft 214 and the feeding rotating shaft 216 are arranged in point symmetry with each other, with the table rotating shaft 212 as a center.

[0052] Each of the winding rotating shaft 214 and the feeding rotating shaft 216 is connected to a drive motor (not shown). The winding rotating shaft 214 and the feeding rotating shaft 216 can rotate clockwise and counterclockwise by the drive motor.

[0053] The turret mechanism 208 is a mechanism configured to switch positions of the winding rotating shaft 214 and the feeding rotating shaft 216 by rotating the turn table 210.

[0054] Though the disk-shaped turn table 210 is shown in Figure 1, the structure of the turn table 210 is not limited if it is possible to switch the positions. For example, the turret mechanism may have a structure provided with a linear arm, an arm rotating shaft configured to rotatably support the center of the arm, and rotating shafts configured to wind and feed packaging sachets, the rotating shafts being on both ends of the linear arm.

[0055] As shown in Figure 1, the winding rotating shaft 214 is located on a side near to the dose-packaging machine 100. For convenience, the position is referred to as a winding position. The winding rotating shaft 214 can rotate clockwise to wind packaging sachets 118 discharged from the dose-packaging machine 100 in a roll shape via the first conveying rollers 204. In other words, the packaging sachets 118 discharged from the dose-packaging machine 100 are wound by the winding rotating shaft 214 corresponding to one rotating shaft among the plurality of rotating shafts (the winding rotating shaft 214 and the feeding rotating shaft 216).

[0056] On the other hand, the feeding rotating shaft 216 is located on a side near to the auditing machine 300. For convenience, the position is referred to as a feeding position. The feeding rotating shaft 216 can rotate counterclockwise to feed other packaging sachets 118 wound in a roll shape to the auditing machine 300 via the second conveying rollers 206 and the discharge port 224. In other words, the packaging sachets 118 discharged from the dose-packaging machine 100 are wound by the feeding rotating shaft 216 corresponding to one rotating shaft among the plurality of rotating shafts (the winding rotating shaft 214 and the feeding rotating shaft 216).

[0057] It is preferable that outer circumferences of the first conveying rollers 204 and the second conveying rollers 206 are configured with soft members (sponges, brushes or the like) so as not to damage medication packaged in packaging sachets 118.

[0058] All packaging sachets 118 are fed from the feeding rotating shaft 216 that is at the feeding position. Dividing and packaging sachets 118 wound by the winding rotating shaft 214 that is at the winding position are targeted by the next feeding.

[0059] It is waited that packaging sachets 118 are wound around the winding rotating shaft 214 until a certain diameter is reached, or winding is ended in a state that packaging sachets 118 have not been wound until the certain diameter is reached. The turn table 210 is caused to rotate at 180° around the table rotating shaft 212. The winding rotating shaft 214 moves to the feeding position, and the feeding rotating shaft 216 moves to the winding position. Having moved to the feeding position, the winding rotating shaft 214 becomes the feeding rotating shaft 216. On the other hand, having moved to the winding position, the feeding rotating shaft 216 becomes the winding rotating shaft 214.

[0060] By rotating the feeding rotating shaft 216 counterclockwise, the packaging sachets 118 that have been already wound are unwound and fed to the auditing machine 300. On the other hand, the winding rotating shaft that has fed the packaging sachets 118 rotates clockwise and winds packaging sachet 118 discharged from the dose-packaging machine 100.

[0061] The conveying machine 200 can be provided with a diameter detecting sensor 220 for a wound roll at the winding position, and a diameter detecting sensor 222 for a feed roll at the feeding position. A roll diameter of the wound packaging sachets 118 is acquired at the winding position by the diameter detecting sensor 220. A winding amount of packaging sachets 118 is calculated.

[0062] A roll diameter of the packaging sachets 118 at the feeding position is acquired by the diameter detecting sensor 222. A feeding amount of the packaging sachets 118 is calculated. A timing to drive the turn table 210 can be controlled based on the winding amount and the feeding amount of the packaging sachets 118. The diameter detecting sensors 220 and 222 are, for example, non-contact type ultrasonic sensors, laser sensors or the like.

[0063] The dose-packaging machine 100 and the auditing machine 300 are different in processing speed. Here, the processing speed means a length of packaging sachets 118 discharged from each of the dose-packaging machine 100 and the auditing machine 300 per unit time. In general, when the dose-packaging machine 100 and the auditing machine 300 are compared, the processing speed of the auditing machine 300 is slower than the processing speed of the dose-packaging machine 100. By having the plurality of rotating shafts (the winding rotating shaft 214 and the feeding rotating shaft 216), the conveying machine 200 shown in Figure 1 can wind packaging sachets 118 at a speed suitable for the processing speed of the dose-packaging machine 100 and feed packaging sachets 118 to the auditing machine 300 at the processing speed of the auditing machine 300. In the embodiment, the turret mechanism 208 functions as a buffer unit. The buffer unit has a function of temporarily storing packaging sachets 118, and the structure is not limited so long as the function can be realized.

[0064] Especially, in a case where the packaging sachets 118 have perforations formed thereon, unintended separation easily occurs on perforations due to a speed difference while the packaging sachets 118 are being conveyed. Therefore, providing the buffer unit is effectively works to adjust the difference between the processing speeds of the dose-packaging machine 100 and the auditing machine 300 while being conveyed.

[0065] It is possible to determine whether the amount of the packaging sachets 118 at the winding position is within a maximum permissible range or not from the winding amount of the packaging sachets 118. The maximum permissible range means a maximum value of a storage amount of packaging sachets 118, and the maximum permissible range can be arbitrarily decided in advance according to the structure of the conveying machine 200.

[0066] It is preferable to, when the amount of the packaging sachets 118 reaches the maximum permissible range, temporarily stop the operation of the dose-packaging machine 100. The temporary stop of the operation can suppress the packaging sachets 118 from getting stuck in the dose-packaging machine 100.

[0067] Figure 4 is a block diagram of the controlling machine 500. The controlling machine 500 is provided with the processing unit 506 and the storing unit 508. The processing unit 506 is provided with a dose-packaging machine controlling unit 512 configured to control the dose-packaging machine 100 (not shown), a conveying machine controlling unit 520 configured to control the conveying machine 200 (not shown) and an auditing machine controlling unit 530 configured to control the auditing machine 300 (not shown).

[0068] Functions of these components are realized by a device, such as a CPU (Central Processing Unit) and various kinds of electronic circuits, referring to data stored in an EEPROM (Electronically Erasable and Programmable Read Only Memory: a non-transitory recording medium) or the like. Further, the functions of these components are performed by executing a medication test supporting program stored in an ROM (Read Only Memory: a non-transitory recording medium) or the like. At the time of processing, a RAM (Random Access Memory) or the like is used as a temporary storage area and a working area. Here, the devices such as the CPU are not shown in Figure 4.

[0069] The dose-packaging machine controlling unit 512 is provided, for example, with a feeder unit 512A and a packaging unit 512B. The feeder unit 512A controls the operation of feeders 104 of the dose-packaging machine 100 based on prescription data. The packaging unit 512B controls the operations of the supplying mechanism 114 and heat sealing mechanism 116 of the packaging mechanism 110.

[0070] The conveying machine controlling unit 520 is provided with, for example, a buffer controlling unit 520A, a conveying unit 520B and a warning unit 520C. The buffer controlling unit 520A controls the operation of the turret mechanism 208. The conveying unit 520B controls the operations of the first conveying rollers 204 and the second conveying rollers 206. When packaging sachets 118 stored in the turret mechanism 208 reaches the maximum permissible range, the warning unit 520C issues a stop signal to the dose-packaging machine controlling unit 512.

[0071] The auditing machine controlling unit 530 is provided, with an imaging unit 530A, an auditing unit 530B, a printing unit 530C and a conveying unit 530D. The imaging unit 530A controls the first camera 308 and the second camera 310 to image audit-target medication packaged in each packaging sachet 118 and acquires an imaged image. The auditing unit 530B outputs information showing whether the audit-target medication shown by the imaged image and medication shown by an image obtained based on the prescription data are the same or not. The printing unit 530C controls the label printer mechanism 316 to perform printing on a label and paste the printed label to the packaging sachet 118. The conveying unit 530D controls the operations of the first conveying rollers 304, the second conveying rollers 306 and the third conveying rollers 332.

[0072] The function of the processing unit 506 can be realized using various kinds of processors. The various kinds of processors include, for example, a CPU (Central Processing Unit) which is a general-purpose processor configured to execute software (a program) to realize various kinds of functions. Further, in the various kinds of processors described above, a programmable logic device (PLD) which is a processor the circuit configuration of which is changeable after production, such as an FPGA (Field Programmable Gate Array), is also included. Furthermore, a dedicated electrical circuit which is a processor having a circuit configuration specially designed to execute particular processing, such as ASIC (Application Specific Integrated Circuit), is also included in the various kinds of processors described above.

[0073] The function of each unit may be realized by one processor or may be realized by a combination of a plurality of processors. Further, a plurality of functions may be realized by one processor. As an example of configuring a plurality of functions with one processor, first, there is a form in which one processor includes a combination of one or more CPU's and software, and this processor realizes the plurality of functions as represented by a computer such as a client and a server. Second, there is a form in which a processor that realizes functions of a whole system by one IC (Integrated Circuit) chip is used, as represented by System On Chip (SoC) or the like. Thus, the function of each unit includes one or more of the various kinds of processors described above as a hardware structure. Further, in order to cause these processors to operate, a computer-readable code of a program that causes a dispensing auditing support device (a computer) to execute a dispensing auditing support method according to the present invention is recorded to a non-transitory recording medium such as a ROM (Read Only Memory) not shown.

[0074] The storing unit 508 includes a non-transitory recording medium such as a CD (Compact Disk), a DVD (Digital Versatile Disk), a hard disk and various kinds of semiconductor memories, and a controlling unit thereof. The storing unit 508 can store, for example, prescription data 508A, medication data 508B, medication images 508C, an audit result 508D and the like. The prescription data 508A is information related to medical prescription and includes, for example, a patient's name, and a name, usage and amount of the medication. The medication data 508B includes an external appearance image of the medication, and a type, shape and size of the medication. The medication images 508C are images of the audit-target medication. The audit result 508D is information showing an audit result created by the processing unit 506.

[0075] An operation of the medication auditing support system 10 according to the embodiment is described with reference to Figures 1 to 4. Medications are prepared in the plurality of feeders 104, and the packaging paper 112 is prepared in the supplying mechanism 114. The feeder unit 512A controls the feeders 104 based on the prescription data 508A, and the feeders 104 supply medication corresponding to one sachet to the packaging mechanism 110. The packaging unit 512B controls the packaging mechanism 110. Pieces of packaging paper 112 are intermittently conveyed from the supplying mechanism 114, and the heat sealing mechanism 116 forms the vertical seal portions on each piece of packaging paper 112 and forms perforations. The medication is supplied to the packaging paper 112 from the feeding pipe 108. The pieces of packaging paper 112 are intermittently conveyed, and the heat sealing mechanism 116 forms the horizontal seal portions on each piece of packaging paper 112. The dose-packaging machine 100 discharges packaging sachets 118.

[0076] The conveying machine 200 receives the packaging sachets 118 from the introduction port 202. The conveying unit 520B controls the first conveying rollers 204 to convey the packaging sachets 118 to the turret mechanism 208. The buffer controlling unit 520A controls the turret mechanism 208. The winding rotating shaft 214 is rotated at the winding position, and the packaging sachets 118 are wound at a speed suitable for the processing speed of the dose-packaging machine 100. The turn table 210 is rotated. The wound packaging sachets 118 are moved to the feeding position. The packaging sachets 118 are unwound at a speed suitable for the processing speed of the auditing machine 300 by the feeding rotating shaft 216. The conveying unit 520B controls the second conveying rollers 206 to feed the packaging sachets 118 to the auditing machine 300 at a speed suitable for the auditing machine 300. The packaging sachets 118 are fed to the auditing machine 300. While the packaging sachets 118 are being fed, the packaging sachets 118 are wound by the winding rotating shaft 214.

[0077] The warning unit 520C calculates the storage amount of packaging sachets 118 from a signal of the diameter detecting sensor 220. The warning unit 520C issues a stop signal as necessary.

[0078] The auditing machine 300 receives the packaging sachets 118 from the introduction port 302. The conveying unit 530D controls the first conveying rollers 304 and the second conveying rollers 306 to convey the packaging sachets 118 to the imaging area. The imaging unit 530A controls the light sources 312, the first camera 308 and the second camera 310 to image medication of each packaging sachet 118 from the upward and downward directions and acquires the medication images 508C.

[0079] The auditing unit 530B acquires the medication data 508B including images, from the prescription data 508A. The auditing unit 530B determines whether the audit-target medication is the same as medication shown in the prescription data 508A or not from the medication data 508B and the medication images 508C, and outputs information about the audit result 508D. The printing unit 530C controls the label printer mechanism 316 to attach a label on which the prescription data and the information obtained by the auditing unit 530B are printed, to the packaging sachet 118. The conveying unit 530D controls the third conveying rollers 332. The third conveying rollers 332 discharge labeled packaging sachets 118 into the accommodation box 400 via the discharge port 334.

[0080] As described above, the conveying machine 200 adjusts the difference between the processing speeds of the dose-packaging machine 100 and the auditing machine 300.

[0081] Next, a preferable mode of the medication auditing support system 10 is described. It is preferable that the controlling machine 500 instructs the dose-packaging machine 100 to package medication, based on the audit result 508D of the auditing machine 300.

[0082] For example, in a case where the audit result 508D is "the medication of the packaging sachet 118 does not correspond to the prescription data 508A", the packaging sachet 118 determined not to correspond (referred to as an improper packaging sachet) is not used. As a result, there are not a required number of packaging sachets 118. The controlling machine 500 controls the dose-packaging machine 100 based on the audit result 508D, and the dose-packaging machine 100 newly packages medication in the packaging paper 112 based on the prescription data of the improper packaging sachet in order to make up for the shortage of the packaging sachets 118. According to the medication auditing support system 10, shortage of packaging sachets 118 is automatically supplemented.

[0083] Figure 5 is a partially enlarged diagram of the auditing machine 300. The same components as those of the auditing machine 300 shown in Figure 1 are given the same reference numerals, and description of the components is omitted.

[0084] As shown in Figure 5, the auditing machine 300 is provided with a passage detecting sensor 342 and a perforation forming machine 344 in this order from the

upstream to the downstream, between the discharge port 334 and the third conveying rollers 332.

[0085] In general, the dose-packaging machine 100 is provided with the perforation forming machine. However, there is a concern that the perforations between the packaging sachets 118 may cause unintended cutting of the packaging sachets 118 during conveyance in the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300. In a case where the packaging sachets 118 is cut during conveyance, the packaging sachets 118 may get stuck in the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300. The jam (clogging) may cause failure of the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300. In order to eliminate the jam, it is necessary to stop any of the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300. The throughput of the medication auditing support system 10 decreases.

[0086] The auditing machine 300 shown in Figure 5 is provided with the perforation forming machine 344 configured to form perforations on the continuous packaging sachets 118 that have been audited. The perforation forming machine 344 of the auditing machine 300 can suppress the packaging sachets 118 from being cut due to the perforations while being conveyed. It is preferable that the perforation forming machine 344 is arranged upstream or downstream of the third conveying rollers 332 which are discharge rollers. Since the packaging sachets 118 on which perforations are formed are discharged from the downstream discharge port 334, tension applied to the perforations of the packaging sachets 118 can be reduced. As a result, it is possible to suppress unintended cutting of the packaging sachets 118.

[0087] The third camera 330 detects vertical seal portions. Since each packaging sachet 118 is conveyed by the conveying unit 530D based on the position of the vertical seal portion, the packaging sachets 118 can be aligned with the positions where labels are attached and perforation forming positions.

[0088] The perforation forming machine 344 includes a first perforation blade (not shown) having a plurality of protruding edges and a second perforation blade (not shown) having holes to receive the protruding edges of the first perforation blade. The vertical seal portion of each packaging sachet 118 is held between the first perforation blade and the second perforation blade so that perforations are formed on the vertical seal portion.

[0089] The passage detecting sensor 342 shown in Figure 5 is a detector configured to detect a movement of one packaging sachet 118. For example, the passage detecting sensor 342 can detect a label attached on the packaging sachet 118 and confirm passage of the one packaging sachet 118. As the passage detecting sensor 342, a reflection-type sensor and a transmission-type sensor is applicable. For example, each of the reflection-type sensor and the transmission-type sensor is provided with a light emitting unit and a light receiving unit.

[0090] When the auditing machine controlling unit 530 detects passage of one packaging sachet 118, information is transmitted to the conveying machine controlling unit 520. Based on a result of the passage detecting sensor 342, the conveying machine controlling unit 520 controls the conveying machine 200. The conveying machine 200 receives the one packaging sachet 118 from the dose-packaging machine 100. By causing the speed of packaging sachets 118 discharged from the auditing machine 300 and the speed of discharge from the dose-packaging machine 100 to almost correspond to each other, the difference between the processing speeds can be adjusted.

[0091] Figure 6 is a partially enlarged diagram of the dose-packaging machine 100 and the conveying machine 200. As shown in Figure 6, the dose-packaging machine 100 is provided with a switching mechanism 130 configured to switch between routes of packaging sachets 118. The switching mechanism 130 is provided with an introduction port 132 for packaging sachets 118, a discharge port 134 for packaging sachets 118, and a movable conveying path 136 between the introduction port 132 and the discharge port 134. The movable conveying path 136 has a fulcrum 138 on the dose-packaging machine 100 side. The movable conveying path 136 can move up and down within a predetermined range, with the fulcrum 138 as a center.

[0092] In Figure 6, when the movable conveying path 136 is at a horizontal position, packaging sachets 118 discharged from the dose-packaging machine 100 pass through the movable conveying path 136 and are received by the conveying machine 200 via the introduction port 202. The packaging sachets 118 are fed from the conveying machine 200 to the auditing machine 300. Therefore, the route of the packaging sachets 118 is switched to a route to feed the packaging sachets 118 to the auditing machine 300.

[0093] When the movable conveying path 136 is inclined diagonally downward from the horizontal position, with the fulcrum 138 as a center, the packaging sachets 118 discharged from the dose-packaging machine 100 pass through the movable conveying path 136 and are accommodated into the accommodation box 400. Therefore, the route can be switched to a route to feed the packaging sachet 118 to a place other than the auditing machine 300.

[0094] When the auditing machine 300 cannot be used because of a failure or the like, a user can use only the dose-packaging machine 100.

[Second embodiment]

[0095] A second embodiment is described with reference to Figures 7 to 10. Here, as for components having the same operation as the first embodiment, the same reference numerals are given, and detailed description of the components is omitted. A configuration of a buffer unit that is different from the other embodiments is mainly

described.

[0096] Figure 7 is a schematic configuration diagram of the conveying machine 200 of the medication auditing support system 10. In Figure 7, the dose-packaging machine 100, the auditing machine 300 and the controlling machine 500 are omitted.

[0097] As shown in Figure 7, the conveying machine 200 is provided with the casing 201 having the introduction port 202 and the discharge port 224, and the pair of first conveying rollers 204, the pair of second conveying rollers 206, a dancer roller mechanism 230 and a pair of third conveying rollers 240 in this order from the upstream toward the downstream side.

[0098] The dancer roller mechanism 230 is provided with two guide rollers 232 and a dancer roller 234 arranged between the two guide rollers 232.

[0099] The dancer roller mechanism 230 is a mechanism configured to change a relative distance between the guide rollers 232 and the dancer roller 234. In the dancer roller mechanism 230, the dancer roller 234 is movably configured. In the embodiment, the two guide rollers 232 are fixed, and the dancer roller 234 can move in the upward and downward directions. For example, a rotating shaft supporting the dancer roller 234 is movable up and down, and can be fixed to a frame or the like in a rotatable state.

[0100] By increasing the distance between the two guide rollers 232 and the dancer roller 234, it is possible to increase the amount of packaging sachets 118 accumulated in the dancer roller mechanism 230. In the second embodiment, the dancer roller mechanism 230 functions as a buffer unit. By adjusting the amount of packaging sachets 118 accumulated in the dancer roller mechanism 230, it is possible to adjust the difference between the processing speeds of the dose-packaging machine 100 (not shown) and the auditing machine 300.

[0101] For example, when the processing speed of the dose-packaging machine 100 is fast, the storage amount of packaging sachets 118 is increased by lowering the dancer roller 234. It is possible to feed the packaging sachets 118 at a conveyance speed suitable for the processing speed of the auditing machine 300 by the third conveying rollers 240.

[0102] The buffer controlling unit 520A shown in Figure 4 controls the operation of the dancer roller mechanism 230. When the dancer roller 234 reaches the lowest point, it is determined that the maximum permissible range has been reached, and the dose-packaging machine controlling unit 512 can stop the dose-packaging machine 100. However, there may be a case where, when the dancer roller 234 reaches the lowest point, the dose-packaging machine 100 is not stopped as necessary.

[0103] Figure 8 is a schematic configuration diagram of the conveying machine 200 according to a modification of the second embodiment. The dancer roller mechanism 230 of the conveying machine 200 is provided with four guide rollers 232 and three dancer rollers 234.

[0104] When the processing speed of the dose-packaging machine 100 is fast, it is preferable that the dancer roller mechanism 230 can accumulate more packaging sachets 118 because of a relationship with the operation of the dose-packaging machine 100. Therefore, it is preferable that the guide rollers 232 and the dancer rollers 234 are arranged at a plurality of stages as shown in Figure 8. The plurality of stages means that the dancer roller mechanism 230 is provided with two or more dancer rollers 234. Though the four guide rollers 232 and the three dancer rollers 234 are shown in Figure 8, the numbers are not limited thereto. The numbers of guide rollers 232 and dancer rollers 234 can be decided in consideration of the processing speeds of the dose-packaging machine 100 and the auditing machine 300.

[0105] Figure 9 is an explanatory diagram showing an operation of the dancer roller mechanism 230 according to the modification of the second embodiment. Reference numeral 901 in Figure 9 shows a state in which all the three dancer rollers 234 are located at the highest points. The packaging sachets 118 are not conveyed.

[0106] Reference numeral 902 in Figure 9 shows a state in which the packaging sachets 118 start to be conveyed from the dose-packaging machine 100 (not shown) to the dancer roller mechanism 230 of the conveying machine 200 (not shown). When the packaging sachets 118 are conveyed to the dancer roller mechanism 230, the dancer roller 234 near to the auditing machine 300 (not shown) is moved toward the lower side. The packaging sachets 118 start to be accumulated.

[0107] Reference numeral 903 in Figure 9 shows a state in which the packaging sachets 118 are continuously being conveyed to the dancer roller mechanism 230. When the dancer roller 234 nearest to the auditing machine 300 reaches the lowest point, the dancer roller 234 in the center is moved toward the lower side. The packaging sachets 118 are further accumulated in the dancer roller mechanism 230.

[0108] Reference numeral 904 in Figure 9 shows a state in which the packaging sachets 118 are continuously being conveyed to the dancer roller mechanism 230. When the dancer roller 234 near to the auditing machine 300 and the dancer roller 234 in the center reach the lowest point, the dancer roller 234 near to the dose-packaging machine 100 is moved toward the lower side. The dancer roller mechanism 230 accumulates the packaging sachets 118 by an amount of the maximum permissible range.

[0109] Reference numeral 905 in Figure 9 shows a state in which conveyance of packaging sachets 118 from the dose-packaging machine 100 is stopped, and the packaging sachets 118 accumulated in the dancer roller mechanism 230 start to be conveyed to the auditing machine 300. The dancer roller 234 near to the auditing machine 300 is moved toward the upper side, and the accumulated packaging sachets 118 are conveyed to the auditing machine 300.

[0110] Reference numeral 906 in Figure 9 shows a state in which the packaging sachets 118 are continu-

ously being conveyed to the auditing machine 300. When the dancer roller 234 near to the auditing machine 300 reaches the highest point, the dancer roller 234 in the center is moved toward the upper side, and the accumulated packaging sachets 118 are conveyed to the auditing machine 300.

[0111] By causing the dancer roller mechanism 230 to operate, it is possible to adjust the difference between the processing speeds of the dose-packaging machine 100 and the auditing machine 300. The operation is not limited to the operation of Figure 9 so long as it is possible to adjust the difference between the processing speeds of the dose-packaging machine 100 and the auditing machine 300.

[0112] Figure 10 is an explanatory diagram showing another operation according to the modification of the second embodiment. As shown in Figure 10, the dancer roller 234 near to the auditing machine 300 (not shown) is moved toward the upper side so that the packaging sachets 118 accumulated in the dancer roller mechanism 230 are conveyed to the auditing machine 300. At the same time, by causing the dancer roller 234 near to the dose-packaging machine 100 to move toward the lower side, the packaging sachets 118 conveyed from the dose-packaging machine 100 are accumulated in the dancer roller mechanism 230.

[0113] It is preferable to control the operations of the dancer rollers 234 in consideration of the difference between the processing speeds of the dose-packaging machine 100 and the auditing machine 300.

[Third embodiment]

[0114] A third embodiment is described with reference to Figure 11. Here, as for components having the same operation as the first and second embodiments, the same reference numerals are given, and detailed description of the components is omitted. A configuration of a buffer unit that is different from the other embodiments is mainly described.

[0115] Figure 11 is a schematic configuration diagram of the conveying machine 200 of the medication auditing support system 10. In Figure 11, the dose-packaging machine 100, the auditing machine 300 and the controlling machine 500 are omitted.

[0116] As shown in Figure 11, the conveying machine 200 is provided with the casing 201 having the introduction port 202 and the discharge port 224, and the pair of first conveying rollers 204, the pair of second conveying rollers 206, a folding mechanism 250, the pair of third conveying rollers 240 and a pair of fourth conveying rollers 246, in this order from the upstream toward the downstream side.

[0117] The folding mechanism 250 is provided with a pair of movable conveying rollers 252 and a position detecting sensor 254. The folding mechanism 250 functions as a buffer unit. The folding mechanism 250 is a mechanism configured to form a folding edge on packaging sachets 118 for each predetermined length of the packaging sachets 118, to stack the packaging sachets 118. The predetermined length can be appropriately set according to the size and the like of the conveying machine 200.

[0118] As shown in Figure 11, the pair of movable conveying rollers 252 can reciprocate in the horizontal direction.

[0119] The packaging sachets 118 conveyed from the dose-packaging machine 100 pass through the pair of movable conveying rollers 252 that continuously reciprocate in the horizontal direction, and are fed to the lower side of the conveying machine 200. As a result, the packaging sachets 118 are accumulated in the folding mechanism 250, being stacked in a zigzag shape by the movable conveying rollers 252.

[0120] From the lower side of the folding mechanism 250, the packaging sachets 118 are conveyed to the auditing machine 300 (not shown) by the third conveying rollers 240 and the fourth conveying rollers 246.

[0121] By accumulating the packaging sachets 118 in the folding mechanism 250 in the zigzag shape, it is possible to adjust the difference between the processing speeds of the dose-packaging machine 100 (not shown) and the auditing machine. The position detecting sensor 254 can detect whether the packaging sachets 118 have reached the maximum permissible range or not.

[0122] In the first to third embodiments, it is preferable to provide a tension adjusting mechanism (not shown) in the conveying machine 200 to impart certain tension to packaging sachets 118. When packaging sachets 118 are fed from the dose-packaging machine 100, the packaging sachets 118 sag down. The tension adjusting mechanism is operated to impart the certain tension to the packaging sachets 118. The packaging sachets 118 are pulled to the conveying machine 200 and received into the conveying machine 200. Therefore, the conveying machine 200 can receive the packaging sachets 118 in synchronization with discharge of the packaging sachets 118 from the dose-packaging machine 100.

[0123] As the tension adjusting mechanism, for example, a dancer roller is applicable. By applying a load to a rotating shaft supporting the dancer roller, the tension on the packaging sachets 118 is decided.

[0124] In the embodiments described above, description has been made on a case where each of the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300 has a separate casing. However, without being limited to the case, a case where the dose-packaging machine 100, the conveying machine 200 and the auditing machine 300 are accommodated in one casing is also possible.

Reference Signs List

[0125]

10 medication auditing support system

100	dose-packaging machine
102	casing
104	feeder
106	hopper
108	feeding pipe
110	packaging mechanism
112	packaging paper
114	supplying mechanism
116	heat sealing mechanism
116A	vertical heating head
116B	horizontal heating head
118	packaging sachet
120	discharge port
122	print head
130	switching mechanism
132	introduction port
134	discharge port
136	movable conveying path
138	fulcrum
200	conveying machine
201	casing
202	introduction port
204	first conveying roller
206	second conveying roller
208	turret mechanism
210	turntable
212	table rotating shaft
214	winding rotating shaft
216	feeding rotating shaft
220	diameter detecting sensor
222	diameter detecting sensor
224	discharge port
230	dancer roller mechanism
232	guide roller
234	dancer roller
240	third conveying roller
246	fourth conveying roller
250	folding mechanism
252	movable conveying roller
254	position detecting sensor
300	auditing machine
301	casing
302	introduction port
304	first conveying roller
306	second conveying roller
308	first camera
310	second camera
312	light source
314	guide
316	label printer mechanism
318	backing paper
320	supplying mechanism
322	label printer
324	label peeling mechanism
326	winding mechanism
330	third camera
332	third conveying roller
334	discharge port
342	passage detecting sensor
344	perforation forming machine
400	accommodation box
500	controlling machine
502	displaying unit
504	operating unit
506	processing unit
508	storing unit
508A	prescription data
508B	medication data
508C	medication image
508D	audit result
510	communication interface
512	dose-packaging machine controlling unit
512A	feeder unit
512B	packaging unit
520	conveying machine controlling unit
520A	buffer controlling unit
520B	conveying unit
520C	warning unit
530	auditing machine controlling unit
530A	imaging unit
530B	auditing unit
530C	printing unit
530D	conveying unit

Claims

1. A medication auditing support system comprising:

a dose-packaging machine configured to package medication based on prescription data and discharge continuous packaging sachets;

a conveying machine configured to receive the continuous packaging sachets discharged from the dose-packaging machine and feed the continuous packaging sachets;

an auditing machine configured to receive the continuous packaging sachets fed from the conveying machine and audit the medication packaged in the packaging sachets based on the prescription data; and

a controlling machine configured to control the dose-packaging machine, the conveying machine and the auditing machine, wherein

the conveying machine comprises a buffer unit configured to store the continuous packaging sachets.

2. The medication auditing support system according to claim 1, wherein

when an amount of the packaging sachets stored in the buffer unit reaches a maximum permissible range, the controlling machine temporarily stops an operation of the dose-packaging machine.

3. The medication auditing support system according

to claim 1 or 2, wherein
the buffer unit includes a dancer roller mechanism.

4. The medication auditing support system according to claim 1 or 2, wherein
the buffer unit includes a turret mechanism comprising a plurality of rotating shafts and configured to switch positions of the plurality of rotating shafts, the turret mechanism being configured to wind a part of the packaging sachets discharged from the dose-packaging machine by one of the rotating shafts and feed another part of the packaging sachets to the auditing machine by another one of the rotating shafts.

5. The medication auditing support system according to any one of claims 1 to 4, wherein
the conveying machine receives the packaging sachets in synchronization with discharge of the packaging sachets from the dose-packaging machine.

6. The medication auditing support system according to claim 5, wherein
the conveying machine imparts certain tension to the continuous packaging sachets and receives only the packaging sachets discharged from the dose-packaging machine.

7. The medication auditing support system according to claim 6, comprising a detector configured to detect a movement of one of the continuous packaging sachets discharged from the dose-packaging machine, wherein
the conveying machine receives the one of the packaging sachets based on a result of the detector.

8. The medication auditing support system according to any one of claims 1 to 7, wherein
the controlling machine instructs the dose-packaging machine to package the medication based on an audit result of the auditing machine.

9. The medication auditing support system according to any one of claims 1 to 8, comprising
a perforation forming machine configured to form perforations on the continuous packaging sachets that have been audited by the auditing machine.

10. The medication auditing support system according to any one of claims 1 to 9, wherein
the dose-packaging machine comprises a switching mechanism configured to switch between a route to feed the packaging sachets to the auditing machine and a route to feed the packaging sachets to a place other than the auditing machine.

Amended claims under Art. 19.1 PCT

1. (Amended) A medication auditing support system comprising:

a dose-packaging machine configured to package medication based on prescription data and discharge continuous packaging sachets;
a conveying machine configured to receive the continuous packaging sachets discharged from the dose-packaging machine and feed the continuous packaging sachets;
an auditing machine configured to receive the continuous packaging sachets fed from the conveying machine and audit the medication packaged in the packaging sachets based on the prescription data; and
a controlling machine configured to control the dose-packaging machine, the conveying machine and the auditing machine; wherein
the conveying machine comprises a buffer unit configured to store the continuous packaging sachets, and
when an amount of the packaging sachets stored in the buffer unit reaches a maximum permissible range, the controlling machine temporarily stops an operation of the dose-packaging machine.

2. (Cancelled)

3. (Amended) The medication auditing support system according to claim 1, wherein
the buffer unit includes a dancer roller mechanism.

4. (Amended) The medication auditing support system according to claim 1, wherein
the buffer unit includes a turret mechanism comprising a plurality of rotating shafts and configured to switch positions of the plurality of rotating shafts, the turret mechanism being configured to wind a part of the packaging sachets discharged from the dose-packaging machine by one of the rotating shafts and feed another part of the packaging sachets to the auditing machine by another one of the rotating shafts.

5. (Amended) The medication auditing support system according to any one of claims 1, 3 or 4, wherein
the conveying machine receives the packaging sachets in synchronization with discharge of the packaging sachets from the dose-packaging machine.

6. The medication auditing support system according to claim 5, wherein
the conveying machine imparts certain tension to the continuous packaging sachets and receives only the packaging sachets discharged from the dose-pack-

aging machine.

7. The medication auditing support system according to claim 6, comprising a detector configured to detect a movement of one of the continuous packaging sachets discharged from the dose-packaging machine, wherein
the conveying machine receives the one of the packaging sachets based on a result of the detector.

8. (Amended) The medication auditing support system according to any one of claims 1 and 3 to 7, wherein the controlling machine instructs the dose-packaging machine to package the medication based on an audit result of the auditing machine.

9. (Amended) The medication auditing support system according to any one of claims 1 and 3 to 8, comprising
a perforation forming machine configured to form perforations on the continuous packaging sachets that have been audited by the auditing machine.

10. (Amended) The medication auditing support system according to any one of claims 1 and 3 to 9, wherein the dose-packaging machine comprises a switching mechanism configured to switch between a route to feed the packaging sachets to the auditing machine and a route to feed the packaging sachets to a place other than the auditing machine.

Statement under Art. 19.1 PCT

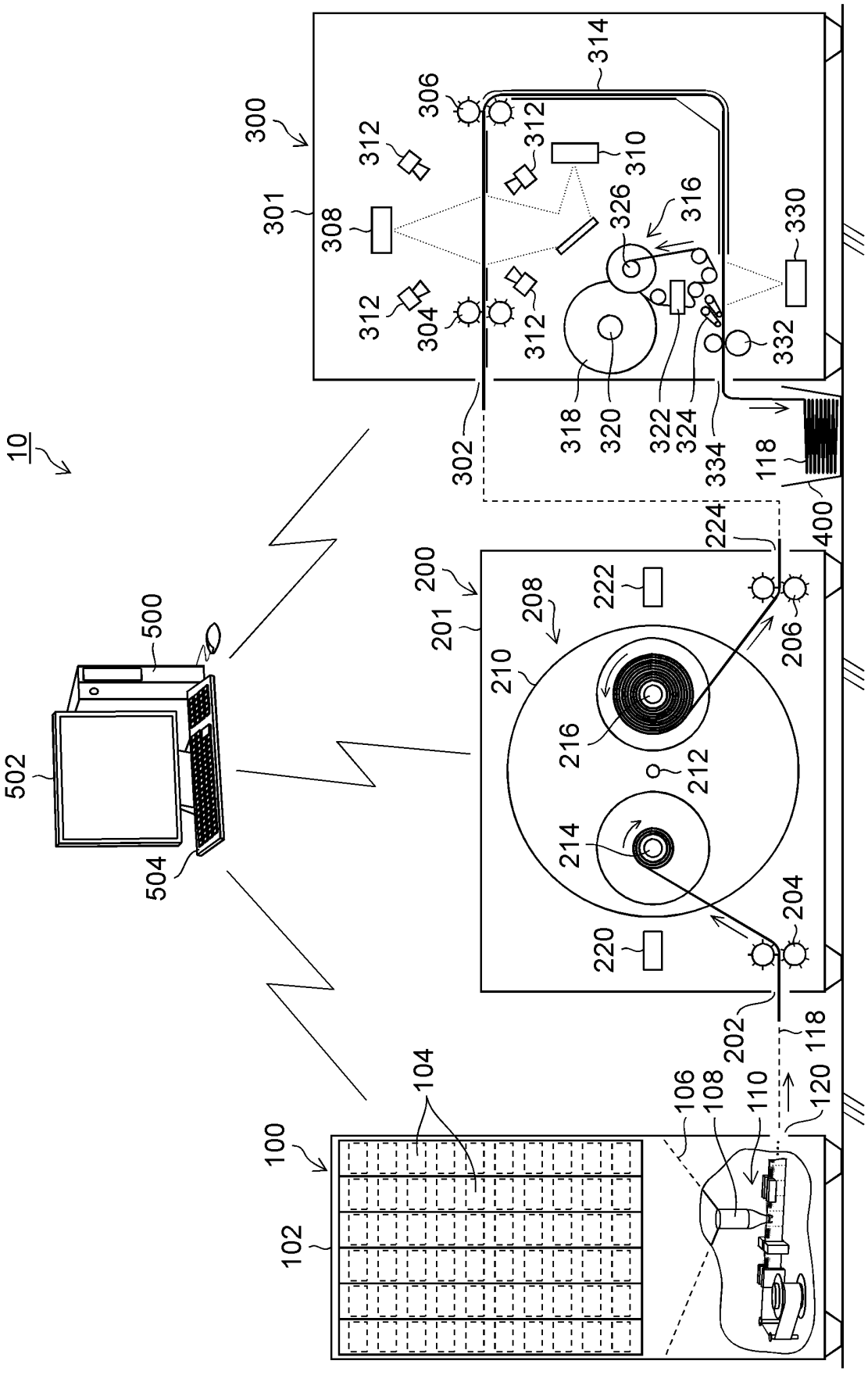
1. Subject matter of amendment

(1) Claim 2 is incorporated to claim 1 by the Applicant
(2) Claim 2 is cancelled
(3) Dependency of claim 3 is amended from "claim 1 or 2" to "claim 1".
(4) Dependency of claim 4 is amended from "claim 1 or 2" to "claim 1".
(5) Dependency of claim 5 is amended from "any one of claims 1 to 4" to "claim 1, 3 or 4".
(6) Dependency of claim 8 is amended from "any one of claims 1 to 7" to "any one of claims 1 and 3 to 7".
(7) Dependency of claim 9 is amended from "any one of claims 1 to 8" to "any one of claims 1 and 3 to 8".
(8) Dependency of claim 10 is amended from "any one of claims 1 to 9" to "any one of claims 1 and 3 to 9".

2. Explanation

The feature set forth in claim 2 is incorporated to claim 1. In addition, due to the above amendment, claim 2 is cancelled, and dependency of claim 3 is amended from "claim 1 or 2" to "claim 1". Further, dependency of claim 4 is amended from "claim 1 or 2" to "claim 1". Further, dependency of claim 5 is amended from "any one of claims 1 to 4" to "claim 1, 3 or 4". Further, dependency of claim 8 is amended from "any one of claims 1 to 7" to "any one of claims 1 and 3 to 7". Further, dependency of claim 9 is amended from "any one of claims 1 to 8" to "any one of claims 1 and 3 to 8". Further, dependency of claim 10 is amended from "any one of claims 1 to 9" to "any one of claims 1 and 3 to 9".
Any of the cited documents does not disclose the configurations of the medication auditing support systems according to claims 1 and 3 to 10.

FIG.1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504
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400
200
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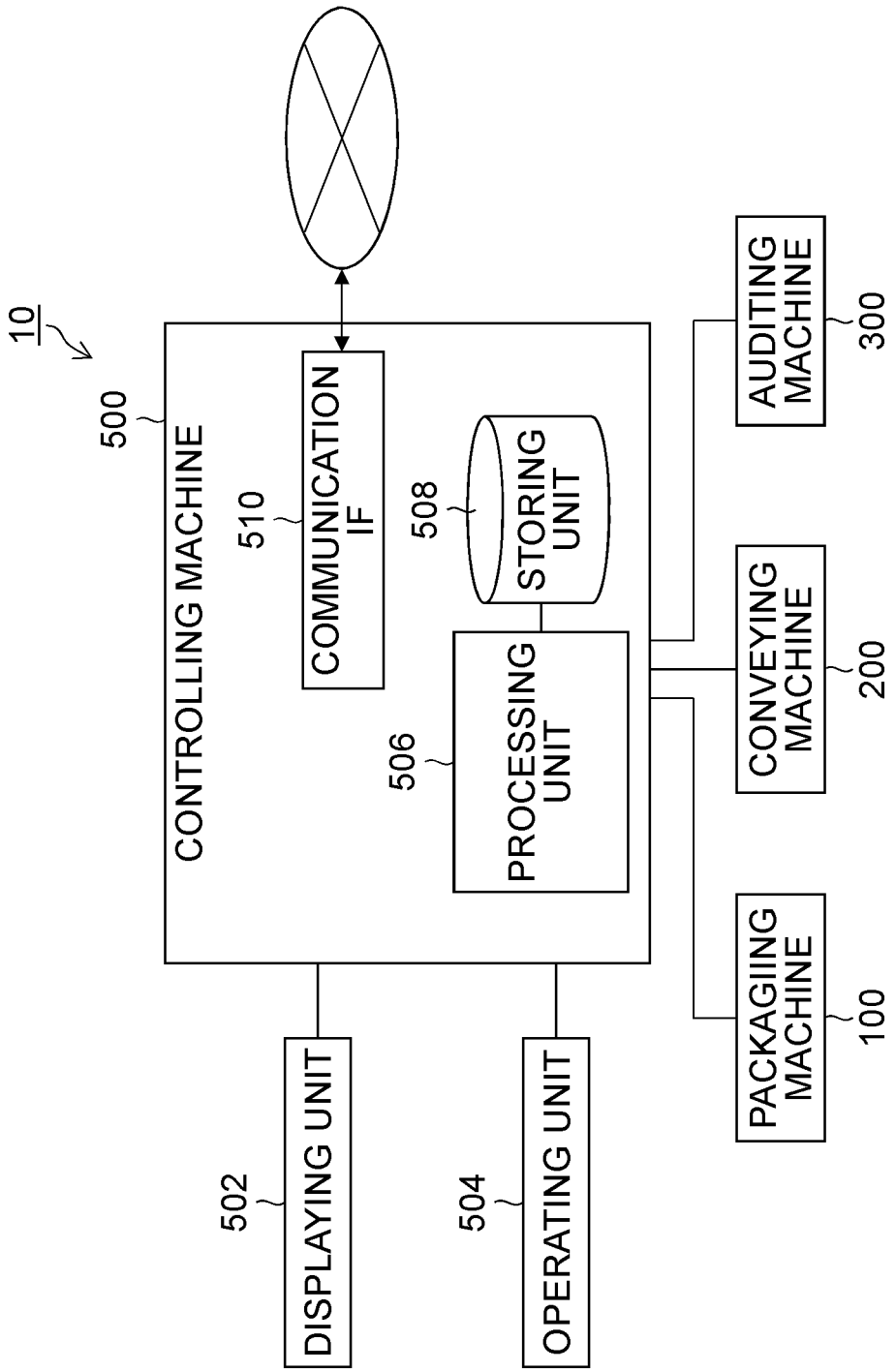
110
120

FIG.2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500
CONTROLLING MACHINE
510
COMMUNICATION IF
508
STORING UNIT
506
PROCESSING UNIT
502
DISPLAYING UNIT
504
OPERATING UNIT
AUDITING MACHINE
300
CONVEYING MACHINE
200
PACKAGING MACHINE
100

FIG.3

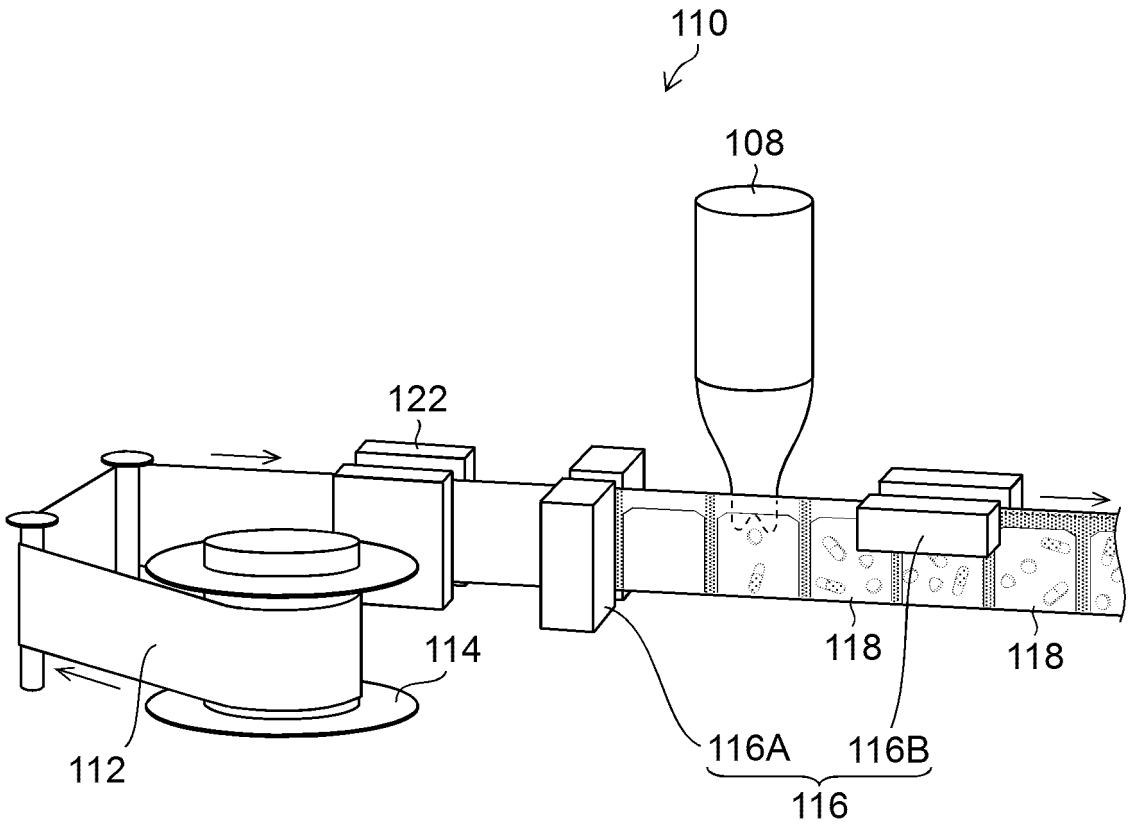

FIG.4

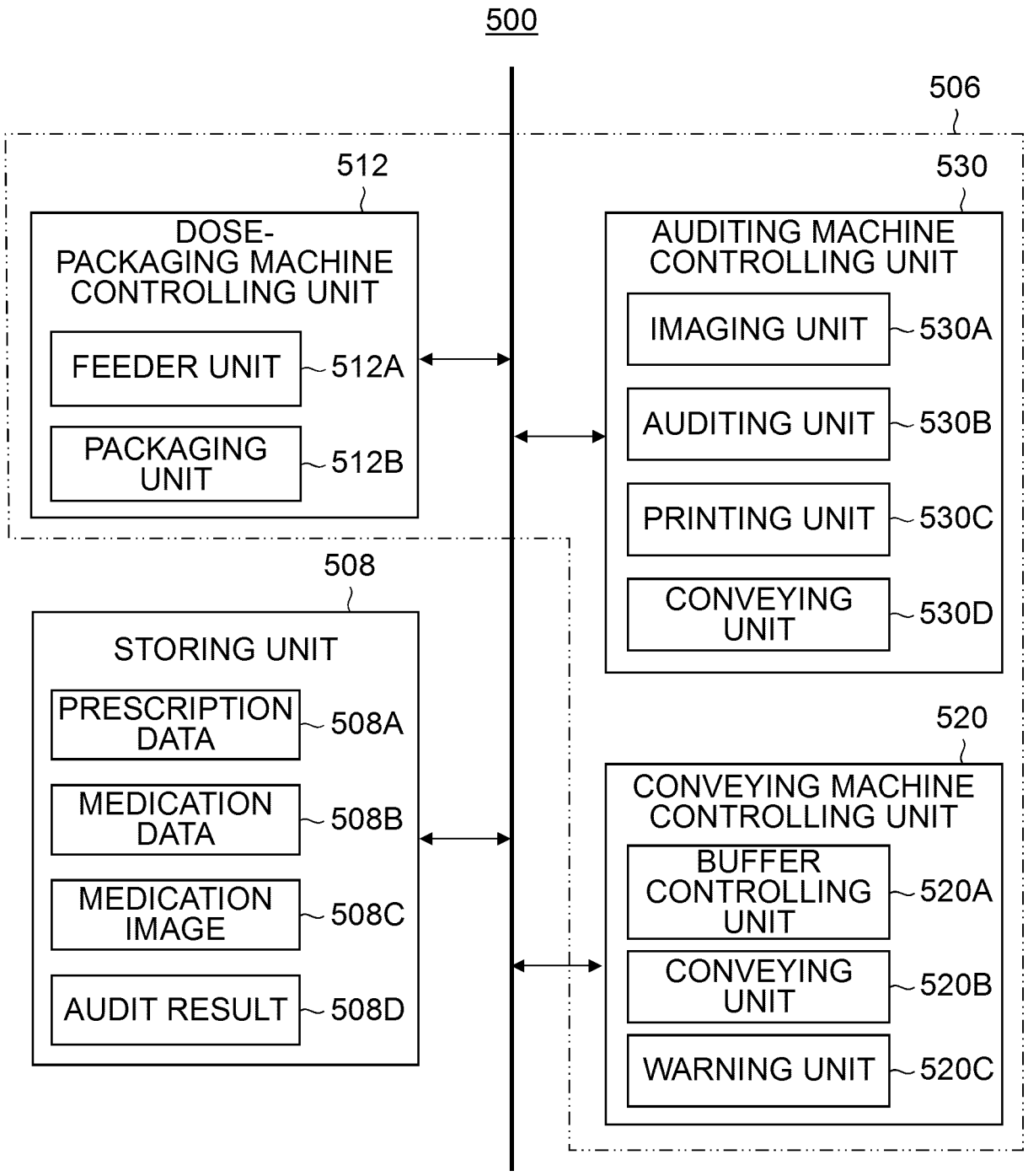
500
506
512
DOSE-PACKAGING MACHINE CONTROLLING UNIT
FEEDER UNIT
512A
PACKAGING UNIT
512B
530
AUDITING MACHINE CONTROLLING UNIT
IMAGING UNIT
530A
AUDITING UNIT
530B
PRINTING UNIT
530C
CONVEYING UNIT
530D
508
STORING UNIT
PRESCRIPTION DATA
508A
MEDICATION DATA
508B
MEDICATION IMAGE
508C
AUDIT RESULT
508D
520
CONVEYING MACHINE CONTROLLING UNIT
BUFFER CONTROLLING UNIT
520A
CONVEYING UNIT
520B
WARNING UNIT
520C

FIG.5

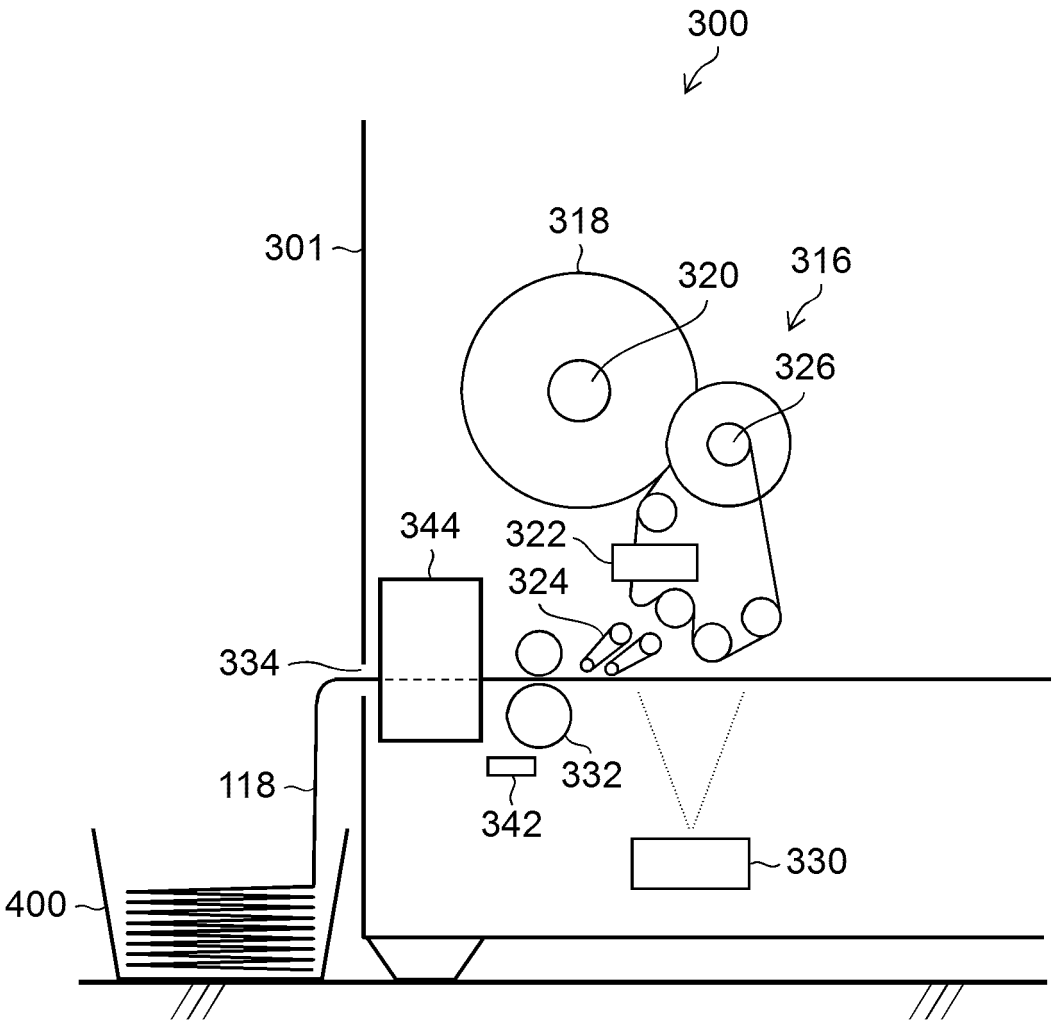

FIG.6

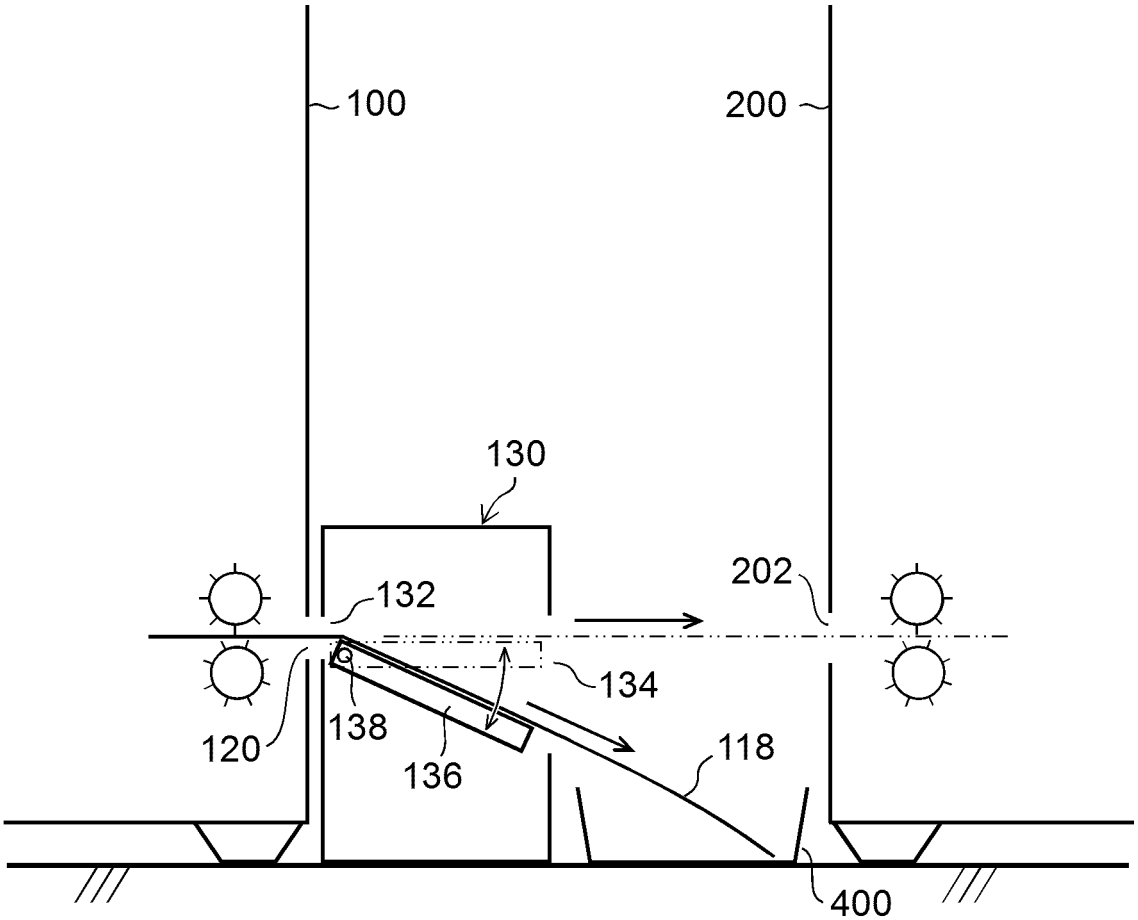

FIG.7

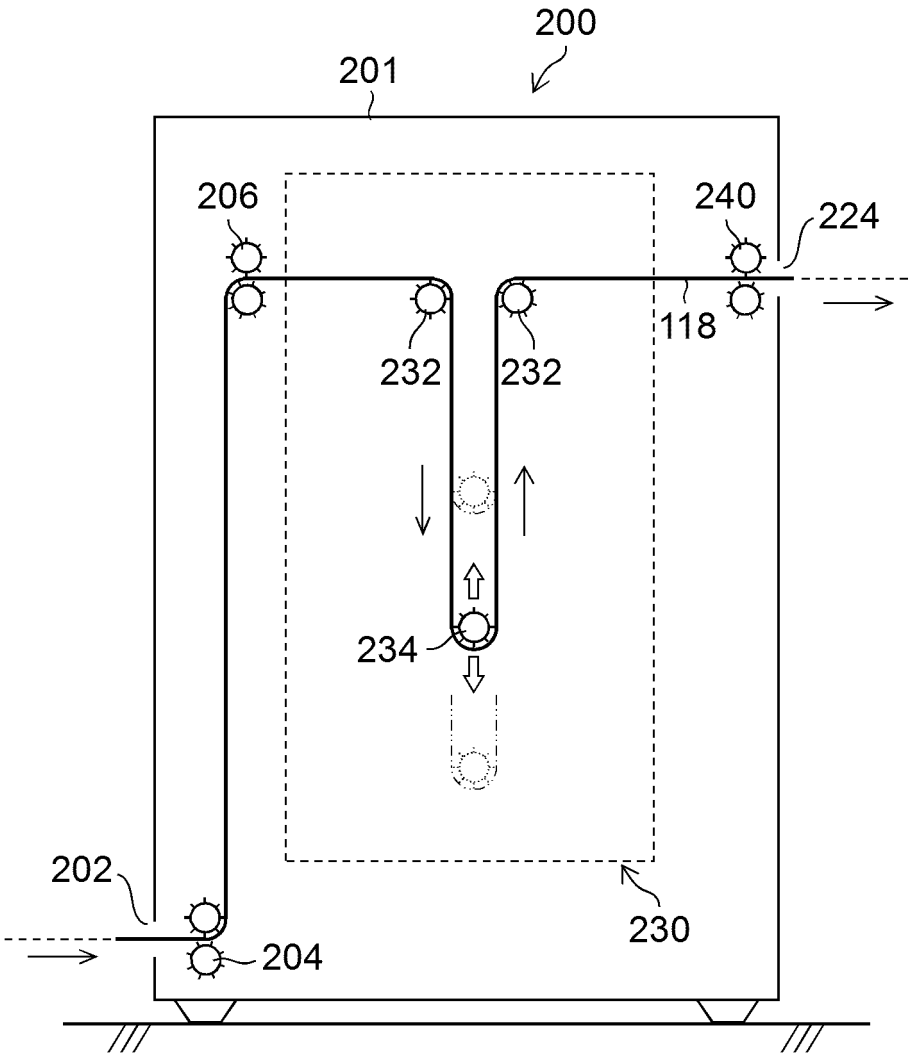

FIG.8

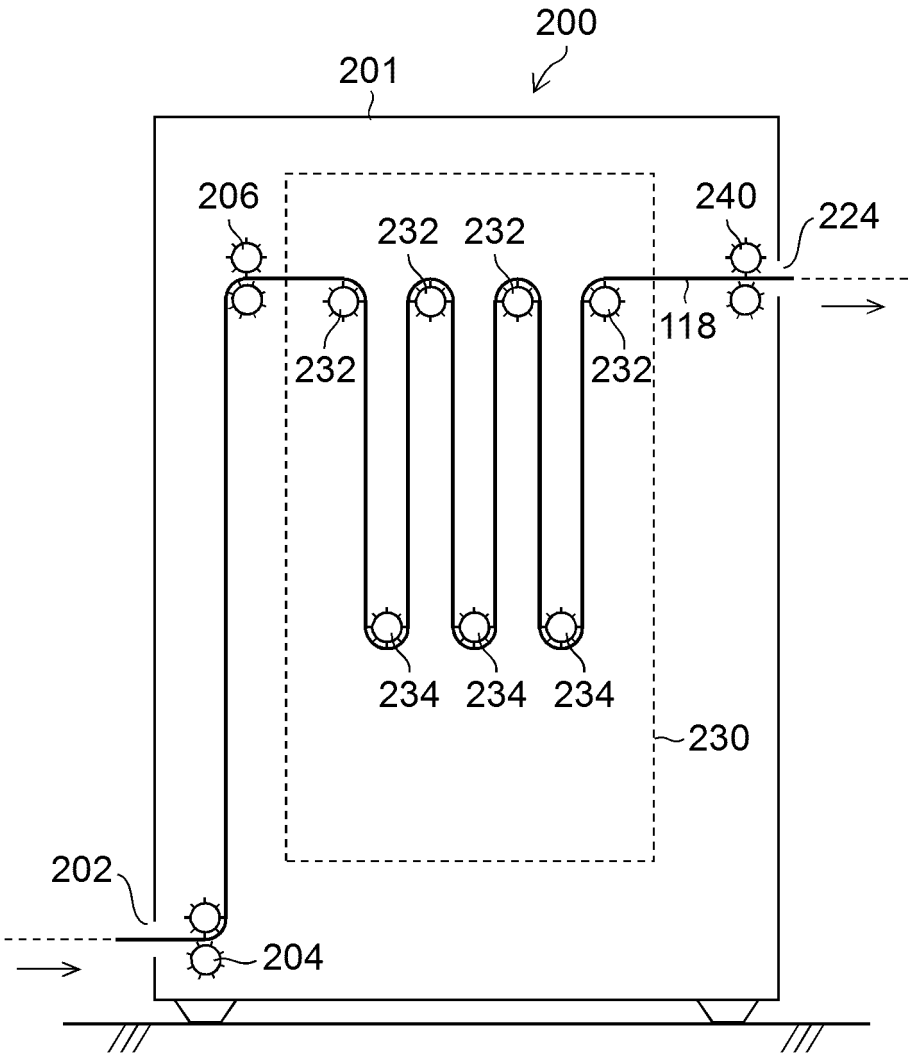

FIG.9

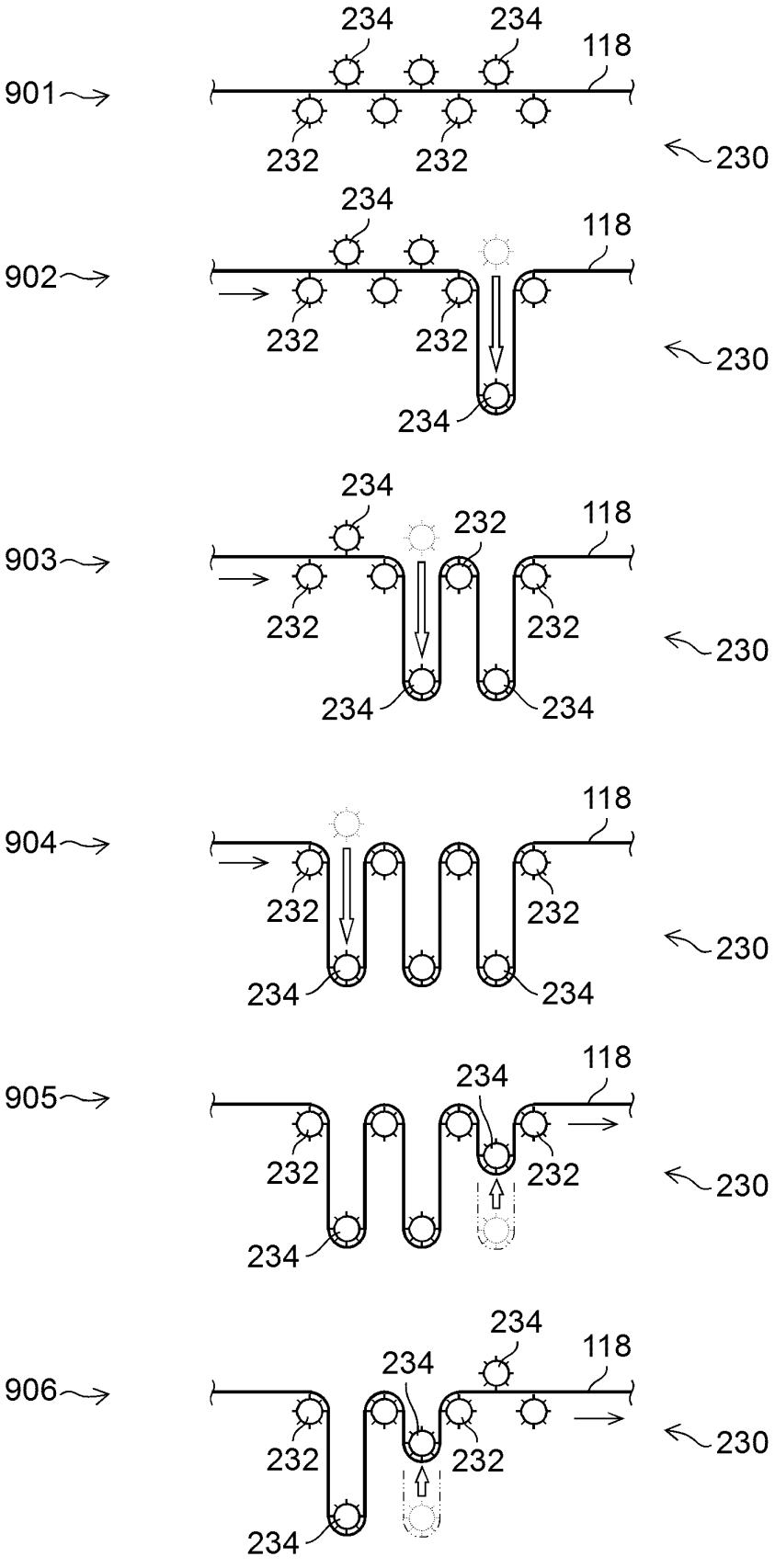

FIG.10

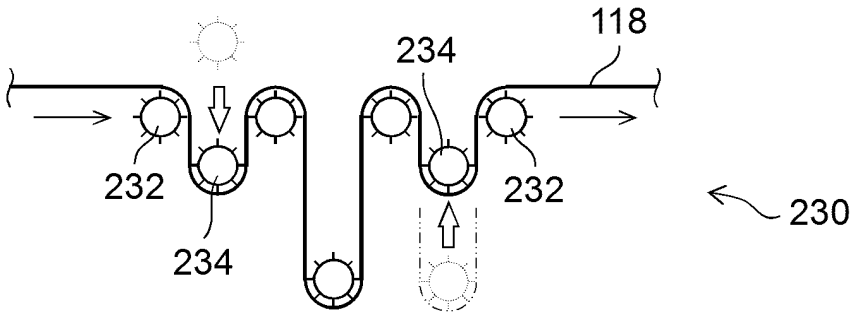
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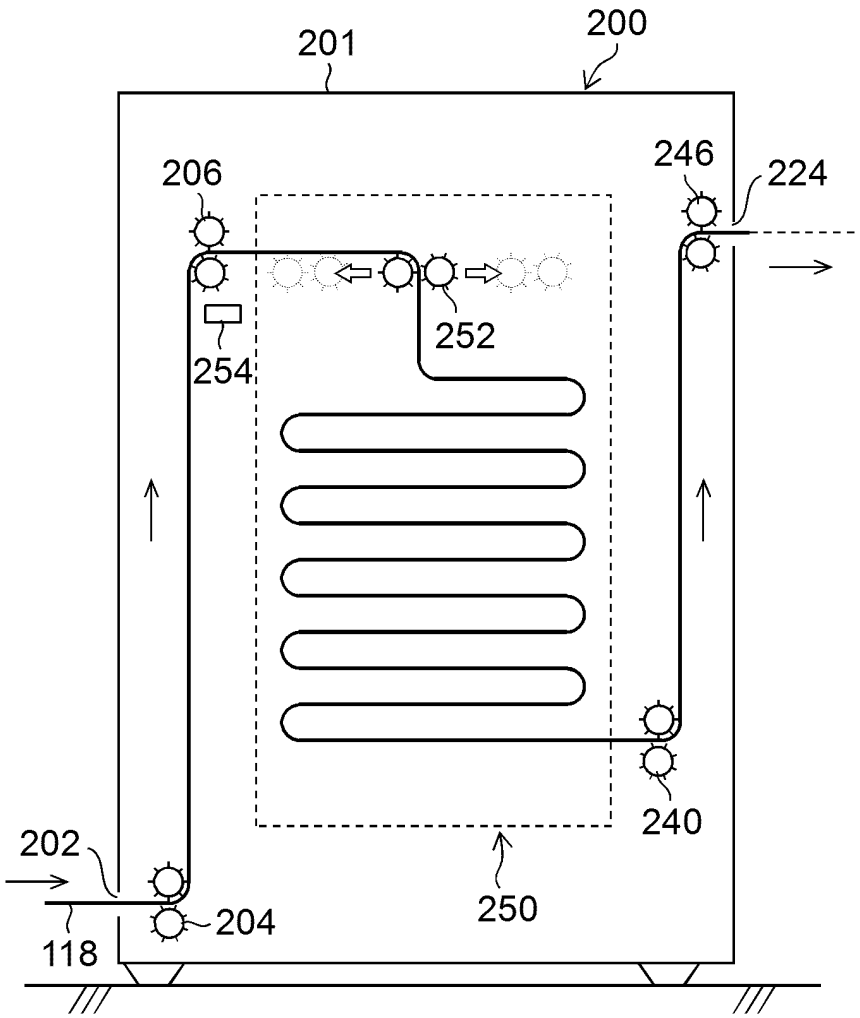
FIG.11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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/048330

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. A61J3/00(2006.01)i

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. A61J3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2019
Registered utility model specifications of Japan	1996-2019
Published registered utility model applications of Japan	1994-2019

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 11-309198 A (YUYAMA MFG CO., LTD.) 09 November 1999, paragraphs [0023]-[0028], fig. 5-8 (Family: none)	1-2, 5, 9 3-4, 6-8, 10
X Y	JP 7-265382 A (TOKYO SHOKAI KK) 17 October 1995, paragraphs [0010]-[0015], fig. 1, 2 (Family: none)	1-2, 9 3-4, 8, 10

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

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"&" document member of the same patent family

Date of the actual completion of the international search 31.01.2019	Date of mailing of the international search report 12.02.2019
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/048330

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 2017-177798 A (SCREEN HOLDINGS CO., LTD.) 05 October 2017, paragraph [0042], fig. 1 & WO 2017/169249 A1	3
Y	JP 2007-297144 A (YOKOHAMA RUBBER CO., LTD.) 15 November 2007, paragraphs [0013], [0014], fig. 1 (Family: none)	4
Y	JP 2017-47975 A (YUYAMA MFG CO., LTD.) 09 March 2017, paragraph [0149] & US 2015/0266604 A1, paragraph [0175] & WO 2014/054447 A1 & EP 2905010 A1 & KR 10-2015-0065811 A & CN 105188637 A	6-7
Y	JP 10-33638 A (TAKAZONO CORPORATION) 10 February 1998, paragraph [0052] (Family: none)	8
Y	JP 2001-212207 A (TOSHO INC.) 07 August 2001, paragraph [0064], fig. 9 (Family: none)	10

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2017209499 A **[0003] [0004]**