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CASSETTE HANDLING APPARATUS

Abstract

A main unit includes a cassette shelf, at least one transporting cassette holder that temporarily holds a cassette removed from the cassette shelf and to be transported to a drug receiver, at least one returning cassette holder that temporarily holds the cassette received from the drug receiver and to be returned to the cassette shelf, and a main cassette transporter that transports the cassette between the cassette shelf and the at least one transporting cassette holder, and between the cassette shelf and the at least one returning cassette holder.

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Background/Summary

RELATED APPLICATIONS [0001] The present application is a continuation of U.S. patent application Ser. No. 18/593,953 filed on Mar. 3, 2024, which is a a continuation of U.S. patent application Ser. No. 17/058,649 filed on Nov. 24, 2020, which is a National Phase of International Application No. PCT/JP2020/002398 filed Jan. 23, 2020, which claims priority to Japanese Application Nos. 2019-015421 filed Jan. 31, 2019, 2019-189578 filed Oct. 16, 2019 and 2019-238859 filed Dec. 27, 2019. The disclosures of the above applications are hereby incorporated by reference herein in their entireties.

FIELD
[0002] The present invention relates to, for example, a cassette handling apparatus and a drug handling apparatus.
BACKGROUND
[0003] Drug dispensers for dispensing drugs have been developed, including those described in Patent Literatures 1 and 2.
[0004] A drug dispenser described in Patent Literature 1 removes one or more drug sheets from a drug storage cassette transported from a cassette shelf to a transporter, and moves a drug tray to a position to receive the drug sheets. This drug dispenser shortens the total time taken to dispense drug sheets.
[0005] An automated drug feeder described in Patent Literature 2 includes a drug picking unit with multiple receptacles for drug storage cassettes transported from a cassette shelf. Each receptacle has a drug slot through which a drug is removed or placed, and a cover to open and close the drug slot. This automated drug feeder is controlled to open the cover of any receptacle receiving a drug storage cassette, thus allowing an intended drug to be removed correctly from multiple storage cassettes received in the drug picking unit.
[0006] Patent Literature 3 describes a method for transporting a medication package from a first receiving place within an area accessible to an operator unit to a dispensing place within an area accessible to an operator, and also for transporting the medication package from a refilling place within the area accessible to the operator to a second receiving place within the area accessible to the operator unit.
CITATION LIST
Patent Literature
Patent Literature 1: WO 2016/047487
Patent Literature 2: Japanese Unexamined Patent Application Publication No. 2011-79642
[0007] Patent Literature 3: Japanese Patent No. 6424217
BRIEF SUMMARY
Technical Problem
[0008] The drug dispenser described in Patent Literature 1 allows operations from removing a drug storage cassette through dispensing drug sheets onto a drug tray without involving manual operations. The drug dispenser described in Patent Literature 1 thus cannot respond to manual

operations for dispensing drug sheets. The automated drug feeder described in Patent Literature 2 is not directed to placing a drug storage cassette efficiently in a single receptacle for preventing erroneous removal of a drug. The method described in Patent Literature 3 is used for transporting a medication package, rather than for transporting a cassette to store a medication package.

[0009] One or more aspects of the present invention are directed to a cassette handling apparatus or a drug handling apparatus that delivers a cassette efficiently to a user who removes or loads a drug from or into the cassette.

Solution to Problem

[0010] In response to the above issue, a cassette handling apparatus according to one aspect of the present invention transports and receives a cassette to and from a drug handling apparatus including a drug receiver that removes a drug from a cassette or loads a drug into the cassette. The cassette handling apparatus includes a cassette shelf that stores a plurality of cassettes, at least one transporting cassette holder that temporarily holds a cassette removed from the cassette shelf and to be transported to the drug receiver, at least one returning cassette holder that temporarily holds the cassette received from the drug receiver and to be returned to the cassette shelf, and a cassette transporter that transports the cassette between the cassette shelf and the at least one transporting cassette holder, and between the cassette shelf and the at least one returning cassette holder.

[0011] A drug handling apparatus according to another aspect of the present invention includes a drug receiver that removes a drug from a cassette or loads a drug into the cassette, and a cassette transporter that transports, to the drug receiver, a first cassette from which a drug is to be removed or into which a drug is to be loaded, and transports, in response to the first cassette being transported to the drug receiver, a second cassette from which a drug is to be removed or into which a drug is to be loaded following the first cassette to a standby position adjacent to the drug receiver at which the second cassette is to be on standby.

Advantageous Effects

[0012] The cassette handling apparatus and the drug handling apparatus according to the aspects of the present invention deliver a cassette efficiently to a user who removes or places a drug from or onto the cassette.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0013] FIG. **1** is a perspective view of a drug station showing its example structure.

[0014] FIG. **2** is a block diagram of the drug station showing its example main components.

[0015] FIG. **3**A is a perspective view of an example large cassette storable in a cassette shelf, FIG. **3**B is a perspective view of an example medium-sized cassette storable in the cassette shelf, FIG. **3**C is a perspective view of an example small cassette storable in the cassette shelf, and FIG. **3**D is a cross-sectional view of the example large cassette.

[0016] FIG. **4**A is a perspective view of an example main unit, and FIG. **4**B is a schematic diagram of an example main cassette transporter.

[0017] FIG. **5** is a view of example cassettes being stored.

[0018] FIG. **6** is a perspective view of a cassette gripper showing its example structure.

[0019] FIGS. **7**A to **7**C are diagrams each describing an example operation of the cassette gripper.

[0020] FIG. **8** is a schematic cross-sectional view of the main unit and a picking unit.

[0021] FIG. **9** is a perspective view of the picking unit showing its example structure.

[0022] FIG. **10**A is a perspective view of an example picking cassette transporter as viewed from the main unit, FIG. **10**B is a perspective view of an example first picking cassette transporter and an example second picking cassette transporter included in the picking cassette transporter,

[0023] FIG. **10**C is a plan view of the example first picking cassette transporter and the example

second picking cassette transporter as viewed from a worktable, and FIG. **10**D is a view of the example first picking cassette transporter and the example second picking cassette transporter as viewed from the main unit.

[0024] FIGS. **11**A to **11**E are diagrams each describing an operation of the first picking cassette transporter for gripping a cassette.

[0025] FIGS. **12**A to **12**H are diagrams each describing an example operation of the first picking cassette transporter and an example operation of the second picking cassette transporter.

[0026] FIGS. **13**A to **13**C are diagrams each describing an example operation of a shutter.

[0027] FIG. **14** is a cross-sectional view of a drug dispenser showing its example structure.

[0028] FIG. **15** is a flowchart showing an example process performed by the main unit and the picking unit for dispensing drug sheets onto a transportation tray.

[0029] FIG. **16** is a flowchart showing an example process performed by the main unit and the picking unit for loading drug sheets into a cassette.

[0030] FIG. **17** is a diagram of an example automated dispensing screen image.

[0031] FIG. **18** is a diagram of another example automated dispensing screen image.

[0032] FIG. **19** is a diagram of an example selected dispensing screen image.

[0033] FIG. **20** is a diagram of an example loading screen image.

[0034] FIG. **21** is a diagram of an example log view screen image.

[0035] FIG. **22** is a diagram of example screen images appearing on a second touchscreen.

[0036] FIG. **23** is a diagram of example screen images appearing on the second touchscreen.

[0037] FIG. **24** is a diagram of example screen images appearing on the second touchscreen.

[0038] FIG. **25** is a diagram of example screen images appearing on the second touchscreen.

[0039] FIG. **26** is a diagram of an example screen image appearing on the second touchscreen.

[0040] FIG. **27** is a diagram of example screen images appearing on the second touchscreen.

[0041] FIG. **28** is a diagram of an example drug preparation system.

[0042] FIG. **29** is a diagram of an example screen image appearing on a tablet terminal.

[0043] FIG. **30** is a diagram of an example screen image appearing on the tablet terminal.

[0044] FIG. **31** is a perspective view of an example main unit.

[0045] FIG. **32** is a perspective view of the example main unit.

[0046] FIG. **33** is a perspective view of an example picking unit.

[0047] FIG. **34** is a diagram of an example drug receptacle and an example tray support included in the picking unit.

[0048] FIG. **35** is a diagram describing removal of a drug sheet from the drug receptacle and removal of a drug sheet from a cassette.

[0049] FIG. **36** is a view of a cassette showing its example structure.

[0050] FIG. **37** is a view of another example cassette.

[0051] FIG. **38** is a perspective view of an example cassette including multiple containers.

[0052] FIG. **39** is a perspective view of an example cassette gripper.

[0053] FIG. **40** is a perspective view of an example drive for the cassette gripper viewed from below.

[0054] FIG. **41** is a perspective view of the example drive for the cassette gripper viewed from below.

[0055] FIG. **42** is a cross-sectional view of the cassette gripper describing an example operation of a lid for the cassette gripper.

[0056] FIG. **43** is a cross-sectional view of the cassette gripper describing an example operation of the lid for the cassette gripper.

[0057] FIG. **44** is a view of a cassette holder showing its example structure.

[0058] FIG. **45** is a view of a receiver unit included in the cassette holder showing its example structure.

[0059] FIG. **46** is a diagram describing an example operation of the cassette holder.

[0060] FIG. **47** is a view of the picking unit showing its example structure.

[0061] FIG. **48** is a front view of an example main unit and an example picking unit.

[0062] FIG. **49** is a diagram of an example guide screen image.

[0063] FIG. **50** is a diagram of another example automated dispensing screen image.

[0064] FIG. **51** is a diagram of other example first confirmation screen images.

[0065] FIG. **52** is a diagram of example third determination screen images.

[0066] FIG. **53** is a diagram of still another example first confirmation screen image and still another example description screen image.

DETAILED DESCRIPTION

First Embodiment

Structure of Drug Station **1**

[0067] The structure of a drug station **1** according to one embodiment will now be described with reference to FIG. **1**. FIG. **1** is a perspective view of a drug station **1** according to the present embodiment showing its example structure.

[0068] The drug station **1** is a drug management system for storing drug sheets, loading and dispensing drug sheets, and inspecting the dispensed drug sheets. As shown in FIG. **1**, the drug station **1** includes a main unit **2**, picking units **3**, an inspection unit **4**, a first touchscreen **5**, a tray transporter **6**, and a tray storage **7**.

[0069] The main unit **2** stores drug sheets. More specifically, the main unit **2** functions as a drug shelf for storing multiple cassettes Ca containing drug sheets (refer to FIGS. **3**A to **3**D). The main unit **2** includes a main cassette transporter **22** (cassette transporters **22***a* and **22***b* in FIG. **4**B) that transports stored cassettes Ca to each picking unit **3** and also transports cassettes Ca received from each picking unit **3** to their previous storage positions. In other words, the main unit **2** functions as a cassette handling apparatus that transports and receives cassettes Ca to and from each picking unit **3**.

[0070] The main unit **2** can store as many different types of drug sheets as expected to be used in a single facility, such as a hospital or a pharmacy (e.g., about 1,500 to 2,000 different types of drug sheets). In the present embodiment, the main unit **2** stores drugs in drug sheets (e.g., press through packs or PTP sheets) but may store drugs in other forms. The main unit **2** may store drugs in any other forms storable in the main unit **2**, such as creams or eyedrops.

[0071] The picking units **3** dispense drug sheets stored in the main unit **2**. For dispensing drug sheets, each picking unit **3** allows a user to perform a picking operation of picking drug sheets. Each picking unit **3** also allows a user to perform a loading operation of loading drug sheets into the main unit **2**. In other words, each picking unit **3** functions as an apparatus for allowing a user to remove drug sheets from cassettes Ca stored in the main unit **2** or to load drug sheets into cassettes Ca (or a drug handling apparatus that allows a user to handle drug sheets).

[0072] Each picking unit **3** includes a second touchscreen **31**, drug receivers **32**, a drug port **331**, and an image sensor **335**. Each picking unit **3** transports a cassette Ca transported from the main unit **2** to the drug receiver **32** using a picking cassette transporter **35** (cassette transporter; refer to FIGS. **10**A to **10**D). The user removes a drug sheet from the cassette Ca transported to the drug receiver **32** while checking the information on the second touchscreen **31**, and then places the drug sheet into the drug port **331**. The placed drug sheet then undergoes image capturing performed by the image sensor **335**, and then is dispensed (or placed) onto a transportation tray Tr, which is then transported to the inspection unit **4** by the tray transporter **6**.

[0073] Each picking unit **3** also includes a barcode reader **34**. The barcode reader **34** reads a barcode (e.g., a GS**1** barcode) on a drug sheet during a loading operation. Each picking unit **3** has the barcode reader **34** on its side wall to avoid interfering with an operation performed by a user at a worktable **36** (refer to FIG. **9**). Each picking unit **3** may include any reader that can read drug identification information for identifying a drug sheet.

[0074] The inspection unit **4** allows a user (a qualified user such as a pharmacist) to conduct a final

inspection on drug sheets dispensed from the main unit **2**. The inspection unit **4** includes a first storage shelf **41***a*, a second storage shelf **41***b*, a third storage shelf **41***c*, and an inspection base **42**. A transportation tray Tr transported from the tray transporter **6** is stored into the first storage shelf **41***a* or into the second storage shelf **41***b*.

[0075] The first storage shelf **41***a* receives and stores, for prescription data prescribing drugs to be administered to a single patient (hereafter simply referred to as prescription data), a transportation tray Tr onto which all the drug sheets indicated by the prescription data have been dispensed from the main unit **2**. The second storage shelf **41***b* receives and stores a transportation tray Tr onto which some of the drug sheets indicated by prescription data have been dispensed from the main unit **2** (for the prescription data prescribing other drugs not stored in the main unit **2**). A user separately places drugs not stored in the main unit **2** (e.g., powdered drugs or liquid drugs) onto a transportation tray Tr. The transportation tray Tr is then stored into the third storage shelf **41***c*. More specifically, the third storage shelf **41***c* receives and stores a transportation tray Tr receiving drugs other than the drug sheets stored in the main unit **2**.

[0076] The prescription data prescribing drugs to be administered to a single patient herein may refer to any of the data sets (1) to (3) below. [0077] (1) Data associated with drugs to be administered to a single patient (prescription data for a single patient). [0078] (2) Data associated with drugs of a single dose to be administered to a single patient (prescription data for a single dose). [0079] (3) Data associated with a classification allocated to a drug(s) of a single dose to be administered to a single patient (prescription data for a single recipe).

[0080] The inspection base **42** allows a user to conduct a final inspection of drug sheets placed onto the transportation tray Tr after the drug sheets are dispensed from the first storage shelf **41***a*, the second storage shelf **41***b*, or the third storage shelf **41***c*. As described above, the transportation tray Tr stored in the first storage shelf **41***a* has received all drug sheets indicated by prescription data. The user removes the transportation tray Tr from the first storage shelf **41***a* onto the inspection base **42** and conducts a final inspection on the transportation tray Tr. In contrast, the transportation tray Tr stored in the second storage shelf **41***b* does not contain all the drug sheets indicated by prescription data. The other drugs indicated by the prescription data are stored in the third storage shelf **41***c*. The user removes the transportation trays Tr receiving drugs prescribed for the patient from the second storage shelf **41***b* and from the third storage shelf **41***c* onto the inspection base **42**, and conducts a final inspection on these transportation trays Tr.

[0081] The first touchscreen **5** is a display for displaying various items of information associated with the drug station **1**, and also functions as an input unit for receiving a user input. In some embodiments, the first touchscreen **5** may function as a display alone. The tray transporter **6** transports transportation trays Tr receiving drug sheets dispensed from each picking unit **3** to the first storage shelf **41***a* and the second storage shelf **41***b* in the inspection unit **4**. The tray transporter **6** has a protective sheet (e.g., an acrylic sheet) on its top for protecting transportation trays Tr to be transported. The tray storage **7** stores transportation trays Tr.

Example Operation of Drug Station **1**

[0082] An example operation of the drug station **1** according to the present embodiment will now be described.

Drug Dispensing Operation

[0083] In response to prescription data read into the drug station **1**, the main cassette transporter **22** in the main unit **2** grips, selectively from cassettes Ca stored in the main unit **2**, a cassette Ca containing drug sheets to be handled (to be dispensed), and places the cassette Ca onto a cassette holder **23** (refer to FIG. **4**A).

[0084] The cassette Ca placed on the cassette holder **23** is transported by the picking cassette transporter **35** to the drug receiver **32**. A user views the second touchscreen **31** and removes a predetermined quantity of drug sheets from the cassette Ca at the drug receiver **32**. The user performing this picking operation may not be a qualified user such as a pharmacist.

[0085] The user ties the removed drug sheets into a predetermined shape and places the tied drug sheets into the drug port **331**. A control unit **10** (refer to FIG. **2**) then determines whether the predetermined quantity of drug sheets has been placed based on an image captured by the image sensor **335**. More specifically, the control unit **10** determines this based on a count of the drug sheets obtained by a measuring unit **336** (described later) (refer to FIG. **9**), in addition to the image captured by the image sensor **335**.

[0086] The predetermined shape may be, for example, any of the shapes described below. The predetermined shape may not be limited to the examples below, but may be any shape that allows the drug quantity to be determined correctly based on the captured image. [0087] (1) For a single drug sheet or for multiple drug sheets, the predetermined shape is the planar shape of the single drug sheet or the multiple drug sheets. [0088] (2) For separate drug pieces alone, the predetermined shape is the planar shape of the separate drug pieces (e.g., two drug pieces). [0089] (3) For a single drug sheet or multiple drug sheets to be tied with separate drug pieces, the predetermined shape is the planar shape of the single drug sheet or the multiple drug sheets on which the separate drug pieces are stacked. To dispense, for example, 22 drug pieces in total from drug sheets each containing 10 drug pieces, the predetermined shape is the shape of a stack of two of these drug sheets on which separate two drug pieces are stacked.

[0090] In response to determining that a predetermined quantity of drug sheets has been placed, the picking unit **3** dispenses the drug sheets onto a transportation tray Tr. For the transportation tray Tr onto which all the drug sheets indicated by the prescription data are dispensed, the tray transporter **6** transports the transportation tray Tr to the first storage shelf **41***a* or the second storage shelf **41***b* in the inspection unit **4**.

[0091] The user then transports the transportation tray Tr stored in the first storage shelf **41***a*, the second storage shelf **41***b*, or the third storage shelf **41***c* to the inspection base **42**. A qualified user such as a pharmacist then conducts a final inspection on the transportation tray Tr.

Drug Loading Operation

[0092] A user first inputs, into the drug station **1**, drug identification information for identifying drug sheets to be loaded into the main unit **2** using the barcode reader **34**. In response to the input drug identification information, the main cassette transporter **22** in the main unit **2** transports, to the cassette holder **23**, a loading target cassette Ca based on the drug identification information.

[0093] The picking cassette transporter **35** in the picking unit **3** transports the cassette Ca placed on the cassette holder **23** to the drug receiver **32**. The user places drug sheets into the cassette Ca transported to the drug receiver **32**. In response to completion of the drug sheets placed into the cassette Ca (e.g., the second touchscreen **31** receiving an operation indicating the completion), the picking cassette transporter **35** transports the cassette Ca to the cassette holder **23**. The main cassette transporter **22** in the main unit **2** then returns the cassette Ca on the cassette holder **23** to a cassette shelf **21**.

[0094] A qualified user such as a pharmacist performs this operation of loading drug sheets.

Main Components of Drug Station

[0095] The main components of the drug station **1** will now be described with reference to FIG. **2**. FIG. **2** is a block diagram of the drug station **1** showing its example main components. The components described above with reference to FIG. **1** will not be described.

[0096] The main unit **2** includes the cassette shelf **21**, the main cassette transporter **22**, and the cassette holder **23**.

[0097] The cassette shelf **21** is a drug shelf that can store multiple cassettes Ca. The cassette shelf **21** in the present embodiment can store cassettes Ca of different sizes (or of different types). FIG. **3**A is a perspective view of an example large cassette Ca**1** storable in the cassette shelf **21**. FIG. **3**B is a perspective view of an example medium-sized cassette Ca**2** storable in the cassette shelf **21**. FIG. **3**C is a perspective view of an example small cassette Ca**3** storable in the cassette shelf **21**. FIG. **3**D is a cross-sectional view of the example large cassette Ca**1**.

[0098] The large cassette Ca**1** includes partitions Ca**11** that define multiple compartments for drug sheets. The single large cassette Ca**1** can contain multiple different types of drug sheets. In the present embodiment, the large cassette Ca**1** includes four partitions Ca**11** that define five compartments (storage positions) for drug sheets. The medium-sized cassette Ca**2** has a smaller width (lateral dimension) than the large cassette Ca**1**, and has a larger width than the small cassette Ca**3**. The medium-sized cassette Ca**2** also includes a partition Ca**21** (defining two compartments in the present embodiment).

[0099] The small cassette Ca**3** may also include one or more partitions that define multiple compartments. The large cassette Ca**1** and the medium-sized cassette Ca**2** may include no partition, and may function as cassettes that can each contain drug sheets of a single type. The cassettes Ca may not be of these three different types, but may be of two different types or four or more different types with different widths or may be of one type.

[0100] The large cassette Ca**1** further has tab receivers Ca**12** on its laterally extending side walls (longitudinal ends). Each tab receiver Ca**12** receives a tab **2212** on the main cassette transporter **22** (refer to FIG. **6**), and receives a protrusion **351***a* on the picking cassette transporter **35** (refer to FIG. **10**B). Each tab receiver Ca**12** receives the tab **2212** or the protrusion **351***a* to allow the main cassette transporter **22** and the picking cassette transporter **35** to remove or place a cassette Ca from or into the cassette shelf **21** or the cassette holder **23**.

[0101] Each tab receiver Ca**12** further has a cut Ca**13**. With the position of the cut Ca**13** detected by a position sensor **2214** (refer to FIG. **6**), the main cassette transporter **22** can transport a cassette gripper **221** (cassette gripper; refer to FIG. **6**) to immediately in front of the large cassette Ca**1** to be transported. The large cassette Ca**1** can thus be removed in a reliable manner.

[0102] The two tab receivers Ca**12** on the two longitudinal ends of the large cassette Ca**1** each include a radio frequency identifier (RFID) tag (not shown). Each RFID tag stores tab receiver identification information for identifying the corresponding tab receiver Ca**12**.

[0103] The cassette Ca removed with its front end having one tab receiver Ca**12** is oriented on the drug receiver **32** differently from when being removed with its front end having the other tab receiver Ca**12**. A single cassette Ca containing different types of drug sheets, like a large cassette Ca**1**, may be oriented differently to have their drug sheets positioned differently with respect to the drug receiver **32**. The control unit **10** that cannot determine the orientation of the cassette Ca may not control a shutter **322** to be open for the storage position of drug sheets to be removed.

[0104] As described above, the tab receiver identification information is prestored for the RFID reader (not shown) in the main cassette transporter **22** (e.g., a cassette drawer **2211**; refer to FIG. **6**). The control unit **10** can thus determine the orientation of the cassette Ca based on tab receiver identification information read from the RFID tag with the RFID reader when the cassette Ca is removed from the cassette shelf **21**. Thus, the control unit **10** can control the shutter **322** to be open at the storage position of drug sheets to be removed in the drug receiver **32**.

[0105] Each of the medium-sized cassette Ca**2** and the small cassette Ca**3** also includes the tab receivers Ca**12**, the cuts Ca**13**, and the RFID tags. In other words, all the cassettes Ca stored in the cassette shelf **21** include the tab receivers Ca**12**, the cuts Ca**13**, and the RFID tags. The picking cassette transporter **35** (e.g., the protrusion **351***a*; refer to FIG. **10**B) may also include an RFID reader. In this case, the control unit **10** can also determine the orientation of the cassette Ca in the same manner as described above based on tab receiver identification information read from the RFID tag with the RFID reader when the cassette Ca is removed from a transporting cassette holder **231** (in the state shown in FIG. **11**C).

[0106] The main cassette transporter **22** transports cassettes Ca between the cassette shelf **21** and the cassette holder **23**. For dispensing drug sheets, the main cassette transporter **22** removes, for example, a cassette Ca containing drug sheets indicated by prescription data from the cassette shelf **21** and transports the cassette Ca to the cassette holder **23**. The main cassette transporter **22** then transports the cassette Ca placed on the cassette holder **23** (the cassette Ca returned from the

picking unit **3** after a predetermined quantity of drug sheets has been removed by the picking unit **3**) to the cassette shelf **21**. For loading drug sheets, the main cassette transporter **22** removes, from the cassette shelf **21**, a cassette Ca into which drug sheets identified by drug identification information read by the barcode reader **34** are to be loaded, and transports the cassette Ca to the cassette holder **23**. The main cassette transporter **22** then transports the cassette Ca placed on the cassette holder **23** (the cassette Ca returned from the picking unit **3** after the drug sheets have been loaded by the picking unit **3**) to the cassette shelf **21**.

[0107] The main cassette transporter **22** can remove a cassette Ca from the cassette shelf **21** and transports the cassette Ca to the picking unit **3**, and can also return the cassette Ca to the cassette shelf **21**.

[0108] The cassette holder **23** is a temporary holder (buffer) for holding a cassette Ca transported from either the cassette shelf **21** or each picking unit **3**. The cassette holder **23** includes the transporting cassette holder **231** and a returning cassette holder **232**. The transporting cassette holder **231** temporarily holds a cassette Ca removed from the cassette shelf **21** and to be transported to the drug receiver **32** included in the picking unit **3**. The returning cassette holder **232** temporarily holds a cassette Ca received from the drug receiver **32** and to be returned to the cassette shelf **21**. In other words, the transporting cassette holder **231** and the returning cassette holder **232** each function as a support for temporarily receiving such cassettes Ca.

[0109] The cassette shelf **21** may store cassettes Ca containing drug sheets with higher frequencies of use at positions nearer the cassette holder **23**. This allows cassettes Ca containing drug sheets with higher frequencies of use to be removed and returned more quickly.

[0110] Each picking unit **3** includes the second touchscreen **31**, the drug receivers **32**, a drug dispenser **33**, the barcode reader **34**, and the picking cassette transporter **35**.

[0111] Similarly to the first touchscreen **5**, the second touchscreen **31** can display various items of information associated with the drug station **1** and can also receive a user input. For dispensing drug sheets, the second touchscreen **31** displays, for example, the type and the quantity of drug sheets to be removed from the drug receiver **32**. For loading drug sheets, the second touchscreen **31** receives an input operation for specifying the type of drug sheets to be loaded or an input operation for specifying a cassette Ca containing drug sheets to be loaded.

[0112] The drug receiver **32** allows a user to remove drug sheets from a cassette Ca or to place drug sheets into a cassette Ca (allows a user to place and receive drug sheets). In the present embodiment, the drug receiver **32** includes a slot **321** and the shutter **322**.

[0113] The slot **321** allows a user access to (removal or loading of drug sheets from or into) a cassette Ca transported to the drug receiver **32**. The shutter **322** is located at the slot **321** to control a user access to the cassette Ca. The shutter **322** is normally closed. The shutter **322** is open for the cassette Ca transported to the drug receiver **32**. The shutter **322** may be open with a varying degree of opening for each cassette Ca from which or into which drug sheets are to be removed or loaded (or placed).

[0114] In the present embodiment, the user directly accesses the cassette Ca transported to the drug receiver **32**. In some embodiments, the user may indirectly access the cassette Ca. For example, the picking unit **3** may include a drug handler that is controlled by the control unit **10** to remove a drug sheet from a cassette Ca transported to the drug receiver **32** and place the drug sheet onto the worktable **36**, or place a drug sheet received from the user into the cassette Ca. In this case, the user accesses a cassette Ca transported to the drug receiver **32** with the drug handler.

[0115] In the present embodiment, the drug receiver **32** may both remove and place drug sheets from and into a cassette Ca. In some embodiments, the drug receiver **32** may simply remove drug sheets from a cassette Ca or simply load drug sheets into a cassette Ca. More specifically, the drug receiver **32** may function as a drug sheet remover that can simply remove drug sheets from a cassette Ca, or may function as a drug sheet placer that can simply place drug sheets into a cassette Ca. The picking unit **3** including the drug receiver **32** as a drug sheet remover functions as a drug

sheet removing device that simply removes drug sheets from a cassette Ca. The picking unit **3** including the drug receiver **32** as a drug sheet placer functions as a drug sheet placing device that simply places drug sheets into a cassette Ca.

[0116] The drug dispenser **33** dispenses drug sheets removed from the drug receiver **32** onto a transportation tray Tr. The drug dispenser **33** includes the drug port **331**, a drug transporter **332**, an upper shutter **333**, a lower shutter **334**, the image sensor **335**, and the measuring unit **336**.

[0117] The drug port **331** receives drug sheets removed from the drug receiver **32**. The drug transporter **332** transports drugs placed into the drug port **331** to a transportation tray Tr.

[0118] The upper shutter **333** is closed to temporarily hold drug sheets transported from the drug transporter **332**, and is open to cause such drug sheets to drop onto the lower shutter **334**. The lower shutter **334** is closed to temporarily hold drug sheets that drop from the upper shutter **333**. The lower shutter **334** is open to cause such drug sheets to drop onto the transportation tray Tr. The upper shutter **333** and the lower shutter **334** are each open and closed at timing adjusted to cause drug sheets to drop to a predetermined position on the transportation tray Tr.

[0119] The image sensor **335** captures an image of drug sheets placed onto the drug transporter **332** through the drug port **331**. The measuring unit **336** measures the weight of the drug sheets placed onto the drug transporter **332** through the drug port **331**. The measuring unit **336** may be, for example, a load cell. The measuring unit **336** may include multiple load cells. In this case, the control unit **10** may compare the measurement values obtained by the multiple load cells and may detect a failed load cell when determining any of the measurement values differ from other measurement values by at least a predetermined value. The control unit **10** may then display an error message on the second touchscreen **31**.

[0120] The picking cassette transporter **35** transports a cassette Ca between the main unit **2** and the picking unit **3** (specifically between the cassette holder **23** and the drug receiver **32**). The cassette Ca can thus be removed from the main unit **2** and transported to the drug receiver **32**, and then returned to the main unit **2**.

[0121] For dispensing drug sheets, for example, the picking cassette transporter **35** transports a cassette Ca from which or into which a drug is to be removed or loaded at the drug receiver **32** (a cassette Ca placed on the transporting cassette holder **231**) to a drug receiving position P**1** (refer to FIGS. **11**A to **11**E) in the drug receiver **32**. When a first cassette Ca is at the drug receiving position P**1**, the picking cassette transporter **35** transports a second cassette Ca from which or into which a drug is to be removed or loaded following the first cassette Ca to a standby position P**2** (refer to FIGS. **11**A to **11**E) adjacent to the drug receiver **32** at which the second cassette Ca is to be on standby. The picking cassette transporter **35** can also transport a cassette Ca from which drug sheets have been removed at the drug receiver **32** to the returning cassette holder **232**.

[0122] The control unit **10** centrally controls the individual units of the drug station **1**. The control unit **10** includes a main unit controller **11**, a picking unit controller **12**, a transporter controller **13**, a touchscreen controller **14**, and a memory **15**.

[0123] The main unit controller **11** centrally controls the components of the main unit **2**. The main unit controller **11** includes a cassette specifier **111** and a main-cassette transporter controller **112**.

[0124] The cassette specifier **111** specifies a cassette Ca to be removed from the cassette shelf **21** based on prescription data, a user input, or a reading by the barcode reader **34**. The cassette specifier **111** also specifies the orientation of the cassette Ca based on tab receiver identification information read by the RFID reader.

[0125] The main-cassette transporter controller **112** controls driving of the main cassette transporter **22**. More specifically, the main-cassette transporter controller **112** controls the main cassette transporter **22** to transport a cassette Ca specified by the cassette specifier **111** to the transporting cassette holder **231**. The main-cassette transporter controller **112** also transports a cassette Ca placed on the returning cassette holder **232** to the storage position (previous position) of the cassette Ca.

[0126] When controlling the main cassette transporter **22** based on prescription data, the main-cassette transporter controller **112** transports, to the transporting cassette holder **231**, a cassette Ca specified by the cassette specifier **111** and containing drug sheets indicated by the prescription data. Subsequently, the main-cassette transporter controller **112** transports, to the storage position of the cassette Ca, the cassette Ca transported by the picking cassette transporter **35** in the picking unit **3** from the drug receiver **32** to the returning cassette holder **232**.

[0127] The picking unit controller **12** centrally controls the components of the picking unit **3**. The picking unit controller **12** includes a picking-cassette transporter controller **121**, a shutter controller **122**, a drug dispenser controller **123**, and a drug determiner **124**.

[0128] The picking-cassette transporter controller **121** controls driving of the picking cassette transporter **35** based on prescription data, a user input, or a reading by the barcode reader **34**. When controlling the picking cassette transporter **35** based on prescription data, the picking-cassette transporter controller **121** transports, to either the drug receiving position P**1** or the standby position P**2**, a cassette Ca from which drug sheets indicated by the prescription data are to be removed.

[0129] The shutter controller **122** controls the shutter **322** to be open and closed. The drug dispenser controller **123** controls driving of the components of the drug dispenser **33** (specifically, the drug transporter **332**, the upper shutter **333**, the lower shutter **334**, and the image sensor **335**).

[0130] The drug determiner **124** determines whether the quantity of drug sheets specified by prescription data has been correctly placed into the drug port **331** based on an image of the drug sheets captured by the image sensor **335** and the weight of the drug sheets measured by the measuring unit **336**. The drug determiner **124** analyzes the image and determines the shape of the drug sheets placed on the drug transporter **332** to specify any separate drug pieces. The memory **15** prestores the shape of a drug sheet of a different drug type. The drug determiner **124** thus compares the shape of one or more drug sheets specified through the image analysis with each of the prestored shape and calculates the number of separate drug pieces. The memory **15** also prestores the weight of a single drug sheet of a different drug type. The drug determiner **124** thus calculates the number of drug pieces placed into the drug port **331** based on the measured weight of one or more drug sheets.

[0131] The transporter controller **13** controls driving of the tray transporter **6**. The touchscreen controller **14** controls information appearing on the first touchscreen **5** and the second touchscreen **31**.

[0132] The memory **15** stores various sets of data to be used by the control unit **10**. The memory **15** stores data indicating, for example, the shape of each drug sheet of a different drug type and the weight of each single drug sheet.

[0133] The memory **15** may also store the data described below. [0134] (1) Data associating cassette identification information about each cassette Ca and the storage position of each cassette Ca in the cassette shelf **21**. [0135] (2) Data associating cassette identification information about each cassette Ca (or storage position information indicating the storage position in each cassette Ca) and drug identification information for each drug sheet. [0136] (3) Type information indicating the type of each cassette Ca.

[0137] The type information may be, for example, information indicating a large cassette Ca**1**, a medium-sized cassette Ca**2**, or a small cassette Ca**3**. The storage position information may be, for example, information indicating the storage position relative to one end of the cassette Ca (using, for example, a distance from the end).

[0138] The memory **15** accumulates images captured by the image sensor **335**. This information can serve as evidence information for the picking operation.

Structure of Main Unit

[0139] The structure of the main unit **2** will now be described in detail with reference to FIGS. **4**A to **8**. FIG. **4**A is a perspective view of an example main unit **2**. FIG. **4**B is a schematic diagram of an example main cassette transporter **22**. FIG. **5** is a view of example cassettes Ca being stored.

Cassette Shelf and Cassette Transporter

[0140] As shown in FIGS. **4**A and **4**B, the cassette shelf **21** can store cassettes Ca in a matrix along a vertical plane. In the present embodiment, as shown in FIG. **5**, the cassette shelf **21** includes cassette shelf plates **211** to receive cassettes Ca and shelf plate supports **212** supporting the cassette shelf plates **211**.

[0141] In the present embodiment, as shown in FIG. **5**, each cassette shelf plate **211** receives cassettes Ca of the same type. More specifically, the width (dimension in X-direction) of each cassette shelf plate **211** and the widths of the large cassette Ca**1**, the medium-sized cassette Ca**2**, and the small cassette Ca**3** are defined to allow each cassette shelf plate **211** to receive cassettes Ca of the same type. In the example shown in FIG. **5**, each cassette shelf plate **211** receives cassettes Ca of the same type. In some embodiments, the width of each cassette shelf plate **211** and the widths of the cassettes Ca of the different types may be defined to allow each cassette shelf plate **211** to receive cassettes Ca of different types.

[0142] Also, as shown in FIG. **4**A, the cassette shelf **21** includes a first cassette shelf **21***a* and a second cassette shelf **21***b* facing each other, between which the main cassette transporter **22** is located. As shown in the figure, the main cassette transporter **22** includes a first main cassette transporter **22***a* and a second main cassette transporter **22***b*.

[0143] The main cassette transporter **22** first draws a cassette Ca stored in the first cassette shelf **21***a* or the second cassette shelf **21***b*, and places the cassette Ca onto the cassette holder **23** (specifically, the transporting cassette holder **231**), as controlled by the main-cassette transporter controller **112**. The main cassette transporter **22** first removes a cassette Ca placed on the cassette holder **23** (specifically, the returning cassette holder **232**), and returns the cassette Ca to the first cassette shelf **21***a* or to the second cassette shelf **21***b*. This allows removal or return of the cassette Ca from or to the cassette shelf **21** storing cassettes Ca in a matrix along the vertical plane. The main-cassette transporter controller **112** controls the first main cassette transporter **22***a* and the second main cassette transporter **22***b* independently of each other.

[0144] Also, as shown in FIGS. **4**A and **4**B, the first main cassette transporter **22***a* includes a first cassette gripper **221***a* (cassette gripper) and a first cassette transporter **222***a*. Similarly, the second main cassette transporter **22***b* includes a second cassette gripper **221***b* (cassette gripper) and a second cassette transporter **222***b*.

[0145] The first cassette gripper **221***a* or the second cassette gripper **221***b* removes a cassette Ca from the cassette shelf **21** or the cassette holder **23** (specifically, the returning cassette holder **232**) and grips the cassette Ca, as controlled by the main-cassette transporter controller **112**. The first cassette gripper **221***a* and the second cassette gripper **221***b* move either vertically or horizontally or both vertically and horizontally to transport the gripped cassette Ca to the cassette shelf **21** or the cassette holder **23** (specifically, the transporting cassette holder **231**), and place the cassette Ca onto the cassette shelf **21** or onto the transporting cassette holder **231**.

[0146] FIG. **6** is a perspective view of the cassette gripper **221** (a first cassette gripper **221***a* and a second cassette gripper **221***b*) showing its example structure. FIGS. **7**A to **7**C are diagrams each describing an example operation of the cassette gripper **221**. As shown in FIG. **6**, the cassette gripper **221** includes the cassette drawer **2211**, the tab **2212**, a cassette support **2213**, the position sensor **2214**, and a rotary drive **2215**.

[0147] As shown in FIG. **6**, the cassette drawer **2211** draws a cassette Ca placed on the cassette shelf **21** or on the cassette holder **23** into the cassette gripper **221**, as controlled by the main-cassette transporter controller **112**. The cassette drawer **2211** is slidable on a rail (not shown) extending along the depth of the cassette gripper **221** below the cassette gripper **221** and is thus movable along the depth of the cassette gripper **221**. The cassette Ca can thus be drawn from the cassette shelf **21** or from the cassette holder **23** or be placed onto the cassette shelf **21** or onto the cassette holder **23**.

[0148] The tab **2212** can be engaged in the tab receiver Ca**12** in the cassette Ca. As shown in FIG.

7A, when the cassette gripper **221** is placed in front of a cassette Ca to be transported, the main-cassette transporter controller **112** moves the cassette drawer **2211** to have the tab **2212** below the tab receiver Ca**12** as shown in FIG. **7**B. Subsequently, the main-cassette transporter controller **112** raises the cassette gripper **221**. This causes the tab **2212** to be temporarily engaged in the tab receiver Ca**12**. In this state, the main-cassette transporter controller **112** moves the cassette drawer **2211** to its previous position to draw the cassette Ca into the cassette gripper **221** as shown in FIG. **7**C.

[0149] To place the gripped cassette Ca onto the cassette shelf **21** or the cassette holder **23**, the operation reverse to the operation of drawing the cassette Ca is performed. More specifically, the main-cassette transporter controller **112** in the state shown in FIG. **7**C first moves the cassette gripper **221** to the position at which the cassette Ca is to be placed, and moves the cassette drawer **2211** to the front of the cassette gripper **221** as shown in FIG. **7**B. Subsequently, the main-cassette transporter controller **112** lowers the cassette gripper **221** to disengage the temporary engagement between the tab **2212** and the tab receiver Cal**2**. Subsequently, the main-cassette transporter controller **112** moves the cassette drawer **2211** to the previous position as shown in FIG. **7**A.

[0150] Referring back to FIG. **6**, the cassette support **2213** supports the cassette Ca drawn by the cassette drawer **2211**.

[0151] The position sensor **2214** detects the cassette gripper **221** located immediately in front of the cassette Ca to be moved. The position sensor **2214** includes, for example, a light emitter that emits light and a light receiver that receives the light. As described above, the cassette Ca includes the cuts Ca**13**. The stop position of the cassette gripper **221** and the storage position (or placement position) of the cassette Ca are determined to direct light emitted from the position sensor **2214** toward the cut Ca**13** when the cassette gripper **221** is located immediately in front of the cassette Ca to be moved.

[0152] When the cassette gripper **221** is immediately in front of the cassette Ca, the light is directed toward the cut Ca**13**. The light receiver does not receive light. In this case, the position sensor **2214** detects the cassette Ca located immediately in front of the cassette gripper **221**. When the cassette gripper **221** is offset from the immediate front of the cassette Ca, the light is not directed toward the cut Ca**13** but travels to and is reflected on the wall surface of the tab receiver Ca**12**. The light is then received by the light receiver. In this case, the position sensor **2214** cannot detect the cassette Ca located immediately in front of the cassette gripper **221**. Thus, the main-cassette transporter controller **112** moves the cassette gripper **221** to cause the position sensor **2214** to detect the cassette Ca located immediately in front of the cassette gripper **221**. More specifically, the main-cassette transporter controller **112** finely adjusts the position of the cassette gripper **221** to direct light from the position sensor **2214** toward the cut Ca**13** without being received by the light receiver. The cassette gripper **221** can thus draw the cassette Ca in a reliable manner.

[0153] The rotary drive **2215** rotates the cassette gripper **221** about the rotation axis in the vertical direction to allow the cassette gripper **221** (specifically, the cassette drawer **2211**) to be movable to the first cassette shelf **21***a*, the second cassette shelf **21***b*, or the cassette holder **23**.

[0154] More specifically, the rotary drive **2215** rotates the cassette gripper **221** to cause the cassette drawer **2211** to face the position to remove or place the cassette Ca either during or after the movement of the cassette gripper **221** to the position to remove or place the cassette Ca, as controlled by the main-cassette transporter controller **112**. The cassette gripper **221** can thus remove or place the cassette Ca at such positions.

[0155] For example, the cassette gripper **221** is rotated by the rotary drive **2215** to cause the cassette drawer **2211** to face the storage position of the cassette Ca to be removed from the first cassette shelf **21***a* or the second cassette shelf **21***b*. The cassette gripper **221** then draws the cassette Ca from the storage position. This allows removal of cassettes Ca from both the first cassette shelf **21***a* and the second cassette shelf **21***b* that are arranged on different vertical planes.

[0156] Referring back to FIGS. **4**A and **4**B, the first cassette transporter **222***a* includes a first beam

223*a* and a first post **224***a*. Similarly, the second cassette transporter **222***b* includes a second beam **223***b* and a second post **224***b*.

[0157] The first beam **223***a* and the second beam **223***b* extend along the width of the cassette shelf **21** (in X direction), and support the first post **224***a* and the second post **224***b* in a slidable manner. The first post **224***a* and the second post **224***b* extend along the height of the cassette shelf **21** (in Z-direction), and support the first cassette gripper **221***a* and the second cassette gripper **221***b* in a slidable manner.

[0158] Also, the first beam **223***a* and the second beam **223***b* are spaced at a predetermined distance between them. The predetermined distance allows the first cassette gripper **221***a* and the second cassette gripper **221***b* to be movable along the width of the cassette shelf **21**. The predetermined distance also allows the first cassette gripper **221***a* and the second cassette gripper **221***b* to be rotatable about the rotation axis in the vertical direction without hitting the first cassette shelf **21***a* and the second cassette shelf **21***b*. The predetermined distance is minimized to downsize the main unit **2**.

[0159] The main-cassette transporter controller **112** moves the first post **224***a* along the first beam **223***a* and the first cassette gripper **221***a* along the first post **224***a* (the same applies to the second cassette transporter **222***b*). This allows a selected cassette Ca to be transported between the cassette shelf **21** and the cassette holder **23**.

[0160] Also, the main-cassette transporter controller **112** controls the first cassette gripper **221***a* and the second cassette gripper **221***b* to be moved (or positioned) to avoid hitting each other.

[0161] More specifically, the first cassette gripper **221***a* and the second cassette gripper **221***b* are both cantilevered on the first beam **223***a* and the second beam **223***b*, which are spaced at the predetermined distance as described above. The first cassette transporter **222***a* and the second cassette transporter **222***b* are controlled to avoid interfering with each other over the movable ranges of the first cassette gripper **221***a* and the second cassette gripper **221***b* (the area between the first beam **223***a* and the second beam **223***b*). Thus, the first cassette gripper **221***a* and the second cassette gripper **221***b* are movable to avoid hitting each other between the cassette shelf **21** (the storage positions of cassettes Ca) and the cassette holder **23**.

[0162] The multiple cassette grippers **221** can thus be used to transport cassettes Ca between the cassette shelf **21** and the cassette holder **23**, thus improving the efficiency of transporting the cassettes Ca.

[0163] The first cassette shelf **21***a* and the second cassette shelf **21***b* may not face each other but may be in any arrangement to have different vertical faces for storing cassettes Ca. This arrangement uses less space to store many cassettes Ca. However, the first cassette shelf **21***a* and the second cassette shelf **21***b* facing each other can be more space-efficient and can store cassettes Ca more densely. The cassette shelf **21** may include a single cassette shelf, or three or more cassette shelves.

[0164] Also, the main cassette transporter **22** may include a single main cassette transporter or three or more main cassette transporters, rather than including two main cassette transporters. The first main cassette transporter **22***a* and the second main cassette transporter **22***b* are controlled to move the first cassette gripper **221***a* and the second cassette gripper **221***b* without hitting each other. This allows efficient transportation of cassettes Ca in the main unit **2** that is compact and has large capacity.

Cassette Holder

[0165] As shown in FIG. **4**A, the cassette holder **23** in the present embodiment includes a first cassette holder **23***a*, a second cassette holder **23***b*, a third cassette holder **23***c*, and a fourth cassette holder **23***d*. In the present embodiment, as shown in FIG. **1**, the main unit **2** includes the two picking units **3**. Each picking unit **3** includes two drug receivers **32** (four in total). The first cassette holder **23***a*, the second cassette holder **23***b*, the third cassette holder **23***c*, and the fourth cassette holder **23***d* are provided for each of the four drug receivers **32**. In this manner, the single cassette

holder **23** corresponds to the single drug receiver **32**.

[0166] Also, as shown in FIG. **8**, the cassette holder **23** corresponds to the picking cassette transporter **35** included in the picking unit **3** to allow transportation of cassettes Ca to and from the drug receiver **32**. More specifically, the single picking cassette transporter **35** is provided for each of the first cassette holder **23***a*, the second cassette holder **23***b*, the third cassette holder **23***c*, and the fourth cassette holder **23***d*. FIG. **8** is a schematic cross-sectional view of the main unit **2** and the picking unit **3**.

[0167] As shown in FIG. **8**, each of the first cassette holder **23***a*, the second cassette holder **23***b*, the third cassette holder **23***c*, and the fourth cassette holder **23***d* includes the transporting cassette holder **231** and the returning cassette holder **232**. In the example shown in FIG. **8**, the single cassette holder **23** corresponding to the single drug receiver **32** includes two transporting cassette holders **231** and two returning cassette holders **232** that are arranged alternately in the vertical direction. The single cassette holder **23** may include three or more transporting cassette holders **231** and three or more returning cassette holders **232**.

[0168] In this manner, the multiple transporting cassette holders **231** and the multiple returning cassette holders **232** may correspond to the single drug receiver **32**. Such multiple transporting cassette holders **231** and multiple returning cassette holders **232** corresponding to the drug receiver **32** can store more cassettes Ca at positions nearer the drug receiver **32** to which these cassettes Ca are to be transported. This structure allows efficient transportation of cassettes Ca to the drug receiver **32**. In some embodiments, a single transporting cassette holder **231** and a single returning cassette holder **232** may be provided for the single drug receiver **32**.

Overview

[0169] In this manner, the main unit **2** includes the cassette shelf **21**, one or more transporting cassette holders **231**, one or more returning cassette holders **232**, and the main cassette transporter **22**.

[0170] This structure allows transportation of cassettes Ca from which or into which drug sheets are to be removed or loaded at the drug receiver **32** from the cassette shelf **21** to the transporting cassette holder **231** and from the returning cassette holder **232** to the cassette shelf **21**.

[0171] During a user operation of picking or loading drug sheets from or into a cassette Ca at the drug receiver **32**, the transporting cassette holder **231** can hold another cassette Ca to be handled following a current cassette Ca at the drug receiver **32**. This structure allows the next cassette Ca can be removed from the cassette shelf **21** before the above operation is compete.

[0172] Also, the returning cassette holder **232** can hold the cassette Ca at the drug receiver **32** after the above operation is complete. The returning cassette holder **232** can hold the cassette Ca while the main cassette transporter **22** is returning the previous cassette Ca. This allows the next cassette Ca to be transported to the drug receiver **32**.

[0173] The main unit **2** can thus efficiently deliver a cassette Ca to a user who removes or loads drug sheets from or into the cassette Ca.

[0174] The cassette holder **23** herein is included in the main unit **2**, but may be included in the picking unit **3**. When the cassette holder **23** is included in the picking unit **3**, the cassette holder **23** is received in a receptacle portion of the picking unit **3** that replaces the portion of the main unit **2** receiving the cassette holder **23** shown in FIG. **4**A. In other words, the cassette handling apparatus described above may basically include the cassette shelf **21**, the main cassette transporter **22**, and the cassette holder **23**.

Structure of Picking Unit

[0175] The structure of the picking unit **3** will now be described in detail with reference to FIGS. **9** to **14**. FIG. **9** is a perspective view of the example picking unit **3** showing its example structure.

[0176] As shown in FIG. **9**, the picking unit **3** includes the worktable **36** at which a user handles drug sheets. The worktable **36** includes the drug receiver **32** with the slots **321** through which drug sheets are to be removed or loaded, and the drug port **331** into which drug sheets removed through

the slot **321** are to be placed. The worktable **36** further includes the picking cassette transporter **35** below the drug receiver **32**. More specifically, the single picking cassette transporter **35** corresponds to the single drug receiver **32** (or the single slot **321**, and the shutter **322** corresponding to the slot **321**; refer to FIG. **8**).

[0177] In the present embodiment, each picking unit **3** includes the drug receivers **32** including a first drug receiver **32***a* and a second drug receiver **32***b*. The picking unit **3** includes, below the first drug receiver **32***a*, the picking cassette transporter **35** including a first picking cassette transporter **35***a* and a second picking cassette transporter **35***b*. The picking unit **3** includes, below the second drug receiver **32***b*, the picking cassette transporter **35** including a first picking cassette transporter **35***a*.

[0178] In the present embodiment, for example, drug sheets are dispensed based on prescription data using the first drug receiver **32***a* and the picking cassette transporter **35** below the first drug receiver **32***a* in the picking unit **3**, and using the first cassette holder **23***a* corresponding to the picking cassette transporter **35** in the main unit **2**.

[0179] As described above, the picking cassette transporter **35** includes the first picking cassette transporter **35***a* and the second picking cassette transporter **35***b*. The first picking cassette transporter **35***a* and the second picking cassette transporter **35***b* are controlled independently of each other by the picking-cassette transporter controller **121** to allow a first cassette gripper **351** and a second cassette gripper **355** to move to avoid hitting each other (refer to FIGS. **10**A to **10**D). This structure allows more efficient dispensing of drug sheets based on prescription data than the structure including a single picking cassette transporter that functions as the picking cassette transporter **35**.

[0180] In contrast, other drug sheets that are not indicated by prescription data are dispensed using the second drug receiver **32***b*, the picking cassette transporter **35** below the second drug receiver **32***b*, and the second cassette holder **23***b*. Thus, the second drug receiver **32***b* may simply include the first picking cassette transporter **35***a* for dispensing such selected drug sheets (e.g., for performing an interrupt process during a drug dispensing operation based on prescription data).

[0181] The second drug receiver **32***b* may be used for dispensing drug sheets based on prescription data. The first drug receiver **32***a* may be used for dispensing selected drug sheets. In some embodiments, the second drug receiver **32***b* may include the first picking cassette transporter **35***a* and the second picking cassette transporter **35***b*, and the first drug receiver **32***a* may include the first picking cassette transporter **35***a* alone. The multiple picking cassette transporters provided for the single drug receiver **32** allow more efficient removal of drug sheets.

[0182] A drug loading operation is performed by the first drug receiver **32***a* at default, but may be performed by the second drug receiver **32***b*.

[0183] Also, each picking unit **3** may include a single drug receiver **32**, instead of including multiple drug receivers **32**. The main unit **2** may include a single picking unit **3**, instead of including multiple picking units **3**. In this case, the main unit **2** may simply include the cassette holder **23** corresponding to the single picking unit **3**.

[0184] As shown in FIG. **9**, the worktable **36** may have the image sensor **335** above the drug port **331** for capturing images of drug sheets placed into the drug port **331**. The worktable **36** may further have the drug transporter **332**, the upper shutter **333**, the lower shutter **334**, and the measuring unit **336** below the drug port **331**.

[0185] The worktable **36** is installed substantially horizontal, but may slope with respect to the horizontal plane. For example, the worktable **36** may slope to have a lower portion adjacent to the standing position of the user and a higher portion adjacent to the main unit **2**. In this case, the picking cassette transporter **35** may operate its cassette gripper to cause the opening of the angled slot **321** to be substantially parallel to the upper surface of a cassette Ca gripped by the cassette gripper. For example, the picking cassette transporter **35** may include a raising and lowering assembly for raising or lowering the cassette gripper at the drug receiver **32**. As shown in FIGS.

10A to 10D, the cassette gripper may include the first cassette gripper 351 and the second cassette gripper 355.

Picking Cassette Transporter Structure

[0186] The structure of the picking cassette transporter 35 will now be described in detail with reference to FIGS. 10A to 10D. FIGS. 10A to 10D are views of an example picking cassette transporter 35. FIG. 10A is a perspective view of the example picking cassette transporter 35 as viewed from the main unit 2. FIG. 10B is a perspective view of an example first picking cassette transporter 35a and an example second picking cassette transporter 35b included in the picking cassette transporter 35. FIG. 10C is a plan view of the example first picking cassette transporter 35a and the example second picking cassette transporter 35b as viewed from the worktable 36. FIG. 10D is a view of the example first picking cassette transporter 35a and the example second picking cassette transporter 35b as viewed from the main unit 2. For ease of explanation, FIGS. 10A to 10D simply show the picking cassette transporter 35 corresponding to the first drug receiver 32a.

[0187] As shown in FIGS. 10A and 10B, the picking cassette transporter 35 corresponding to the first drug receiver 32a includes the first picking cassette transporter 35a and the second picking cassette transporter 35b.

[0188] The first picking cassette transporter 35a and the second picking cassette transporter 35b each receive a cassette Ca placed on the transporting cassette holder 231 and transport the received cassette Ca to the first drug receiver 32a. The first picking cassette transporter 35a and the second picking cassette transporter 35b also transport a cassette Ca at the first drug receiver 32a to the returning cassette holder 232.

[0189] As shown in FIG. 10B, the first picking cassette transporter 35a includes the first cassette gripper 351 and a first cassette transporter 352.

[0190] The first cassette gripper 351 grips a cassette Ca. In the present embodiment, the first cassette gripper 351 includes a frame having, on each of its laterally extending side walls (extending in X-direction) or its longitudinal ends, a protrusion 351a to be received in the tab receiver Ca12 in a cassette Ca (refer to FIGS. 3A to 3D). The frame has a hollow to receive the bottom of a cassette Ca and the cassette holder 23 (the first cassette holder 23a herein) to pass through it when the first cassette gripper 351 moves vertically. The frame has the hollow sized to be engageable with the protrusion 351a. When the first cassette gripper 351 moves vertically in the cassette holder 23, the protrusion 351a is received in the tab receiver Ca12 on the cassette holder 23, allowing the first cassette gripper 351 to grip the cassette Ca.

[0191] The first cassette transporter 352 moves the first cassette gripper 351. The first cassette transporter 352 includes a first beam 353 and first posts 354. The first beam 353 extends in the depth direction (Y-direction) of the picking unit 3, and supports the first cassette gripper 351 in a slidable manner. The first posts 354 extend in the height direction (Z-direction) of the picking unit 3, and supports the first beam 353 in a slidable manner. The picking-cassette transporter controller 121 moves the first beam 353 along the first posts 354, and moves the first cassette gripper 351 along the first beam 353. This allows selected cassettes Ca to be transported between the cassette holder 23 and the drug receiver 32.

[0192] As shown in FIG. 10B, the second picking cassette transporter 35b includes the second cassette gripper 355 and a second cassette transporter 356. Similarly to the first cassette gripper 351, the second cassette gripper 355 has, on each of its lateral side walls, a protrusion to be received in the tab receiver Ca12 in a cassette Ca. The second cassette transporter 356 includes a second beam 357 and second posts 358. The second cassette gripper 355 and the second cassette transporter 356 have the same structure and the same functions as the first cassette gripper 351 and the first cassette transporter 352.

[0193] As shown in FIGS. 10C and 10D, the first beam 353 and the second beam 357 are spaced apart to allow the first cassette gripper 351 and the second cassette gripper 355 to be movable in the

depth direction of the picking unit **3**.

[0194] The picking-cassette transporter controller **121** controls the first cassette gripper **351** and the second cassette gripper **355** to be moved (or positioned) to avoid hitting each other.

[0195] More specifically, the first cassette gripper **351** and the second cassette gripper **355** are both cantilevered on the first beam **353** and the second beam **357**, which are spaced apart as described above. The first cassette transporter **352** and the second cassette transporter **356** are controlled to avoid interfering with each other over their respective movable ranges (the area between the first beam **353** and the second beam **357**). Thus, the first cassette gripper **351** and the second cassette gripper **355** are movable to avoid hitting each other between the cassette holder **23** and the drug receiver **32**.

[0196] This structure allows cassettes Ca to be transported with the multiple cassette grippers between the cassette holder **23** and the drug receiver **32** and improves the efficiency of transporting cassettes Ca.

[0197] An operation of the first picking cassette transporter **35***a* for gripping a cassette Ca will now be described with reference to FIGS. **11**A to **11**E. FIGS. **11**A to **11**E are diagrams each describing the operation of the first picking cassette transporter **35***a* for gripping a cassette Ca. With the cassette Ca placed on the transporting cassette holder **231**, the first beam **353** first moves vertically along the first posts **354** to move the first cassette gripper **351** to immediately below the transporting cassette holder **231**. Subsequently, as shown in FIG. **11**A, the first cassette gripper **351** moves horizontally toward the transporting cassette holder **231**, and then stops at a position immediately below the transporting cassette holder **231** as shown in FIG. **11**B.

[0198] As shown in FIG. **11**C, the first beam **353** moves vertically upward along the first posts **354** to cause the transporting cassette holder **231** to pass through the hollow of the first cassette gripper **351** and the protrusion **351***a* in the first cassette gripper **351** to be received and temporarily engaged in the tab receiver Ca**12** in the cassette Ca. The first cassette gripper **351** can thus grip the cassette Ca.

[0199] The first cassette gripper **351** gripping the cassette Ca moves along the first beam **353** to below the slot **321**, while the first beam **353** is moving vertically upward along the first posts **354** to move the first cassette gripper **351** to immediately below the slot **321**. As shown in FIG. **11**D, the first cassette gripper **351** can transport the cassette Ca to immediately below the slot **321**, allowing the user to remove or load drug sheets from or into the cassette Ca gripped by the first cassette gripper **351**.

[0200] The position immediately below the slot **321** (specifically, the position at which the user can remove or load drug sheets from or into the cassette Ca) is referred to as a drug receiving position P**1**.

[0201] After the user completes an operation at the drug receiving position P**1**, the first beam **353** moves vertically downward along the first posts **354** to move the first cassette gripper **351** to immediately above the returning cassette holder **232**. Also, the first cassette gripper **351** moves along the first beam **353** toward the returning cassette holder **232**. Subsequently, the operation reverse to the operation shown in FIG. **11**C is performed. More specifically, the first beam **353** moves vertically downward along the first posts **354** to place the cassette Ca onto the transporting cassette holder **231**. In this state, the protrusion **351***a* is separated from the tab receiver Ca**12**, disengaging the temporary engagement between the protrusion **351***a* and the tab receiver Ca**12**. Subsequently, the first cassette gripper **351** allows the returning cassette holder **232** to pass through the hollow and moves to the transporting cassette holder **231**.

[0202] The second picking cassette transporter **35***b* moves in the same manner as the first picking cassette transporter **35***a*. For example, the second picking cassette transporter **35***b* grips a second cassette Ca containing drug sheets to be removed or loaded following the cassette Ca gripped by the first cassette gripper **351**, and transports the second cassette Ca to the drug receiving position P**1**.

[0203] As shown in FIG. **11**E, when the first cassette gripper **351** is at the drug receiving position P**1**, the second cassette gripper **355** moves to the standby position P**2** adjacent to the drug receiver **32** (specifically, adjacent to the drug receiving position P**1**). Subsequently, after the first cassette gripper **351** moves toward the returning cassette holder **232**, the second cassette gripper **355** moves to the drug receiving position P**1**. The first cassette gripper **351** returns the cassette Ca to the returning cassette holder **232**, and then grips another cassette Ca placed on the transporting cassette holder **231** and moves the cassette Ca to the standby position P**2**. This operation is repeated.

[0204] In the present embodiment, as shown in FIG. **11**E, the standby position P**2** is below the drug receiving position P**1**, and is more away from the main unit **2** than the drug receiving position P**1** in the depth direction of the picking unit **3**. This allows the cassette gripper at the drug receiving position P**1** to move toward the returning cassette holder **232** without hitting the cassette gripper at the standby position P**2**.

Example Operation of Picking Cassette Transporter

[0205] An example operation of the picking cassette transporter **35** will now be described with reference to FIGS. **12**A to **12**H. FIGS. **12**A to **12**H are diagrams each describing an example operation of the first picking cassette transporter **35***a* and an example operation the second picking cassette transporter **35***b*. In FIGS. **12**A to **12**H, each hatched arrow indicates the movement of the first cassette gripper **351**, each solid arrow indicates the movement of the second cassette gripper **355**, and each outline arrow indicates the movement of a cassette Ca transported by the main cassette transporter **22**. At the start of the example operation described below, the first cassette gripper **351** gripping a cassette Ca is at the drug receiving position P**1**, and the second cassette gripper **355** gripping a cassette Ca is at the standby position P**2**, as illustrated.

[0206] In the present embodiment, as shown in FIGS. **12**C to **12**F, the first picking cassette transporter **35***a* (the first cassette gripper **351** and the first cassette transporter **352**) can access the transporting cassette holder **231** and the returning cassette holder **232** in the upper shelf. Also, as shown in FIGS. **12**C and **12**F to **12**H, the second picking cassette transporter **35***b* (the second cassette gripper **355** and the second cassette transporter **356**) can access the transporting cassette holder **231** and the returning cassette holder **232** in the lower shelf. In FIGS. **12**A to **12**H, the transporting cassette holder **231** and the returning cassette holder **232** in the upper shelf are a transporting cassette holder **231***a* and a returning cassette holder **232***a*. Similarly, the transporting cassette holder **231** and the returning cassette holder **232** in the lower shelf are a transporting cassette holder **231***b* and a returning cassette holder **232***b*.

[0207] The transporting cassette holder **231** and the returning cassette holder **232** in the cassette holder **23** may be at any positions. In other words, the portion of the cassette holder **23** to function as the transporting cassette holder **231** or as the returning cassette holder **232** may be set as appropriate. The setting may be changed by the control unit **10** in accordance with the operating state of the drug station **1** including the main unit **2** (e.g., depending on the dispensing situations of drug sheets).

[0208] More specifically, the receptacle for a cassette Ca included in the cassette holder **23** may function as the transporting cassette holder **231** or as the returning cassette holder **232** in a switchable manner in accordance with the operating state, as controlled by the control unit **10**. The cassette receptacle can thus function as the transporting cassette holder **231** or as the returning cassette holder **232** in accordance with the operating state. The cassette holder **23** can hold a cassette Ca efficiently in accordance with the operating state. In some embodiments, the cassette receptacle may function as the transporting cassette holder **231** or as the returning cassette holder **232** in a switchable manner independently of the operating state (in response to, for example, a user input).

[0209] Also, the positions of the cassette holder **23** to be accessed by the first picking cassette transporter **35***a* and the second picking cassette transporter **35***b* may be set as appropriate. The setting may be switched as appropriate as controlled by the control unit **10** in accordance with the

operating state.

[0210] As shown in FIG. **12**A, as described above, the first cassette transporter **352** in the first picking cassette transporter **35***a* may transport the first cassette gripper **351** gripping the cassette Ca to the drug receiving position P**1**. In this state, the shutter **322** is open to allow a picking operation to be performed on the cassette Ca gripped by the first cassette gripper **351**. The second cassette transporter **356** in the second picking cassette transporter **35***b* may transport the second cassette gripper **355** gripping the cassette Ca to the standby position P**2**. More specifically, the second cassette gripper **355** gripping the cassette Ca may be on standby at the standby position P**2**.

[0211] During the picking operation, the main cassette transporter **22** may place another cassette Ca onto the transporting cassette holder **231***a* as shown in FIG. **12**B.

[0212] In response to completion of the picking operation on the cassette Ca gripped by the first cassette gripper **351** and the drug determiner **124** determining that the type and the quantity of drug sheets placed into the drug port **331** are correct, the shutter **322** is closed. In response to the shutter **322** being closed, as shown in FIG. **12**C, the first cassette transporter **352** first moves the first cassette gripper **351** to the returning cassette holder **232***a*, and then places the cassette Ca gripped by the first cassette gripper **351** onto the returning cassette holder **232***a*. The second cassette transporter **356** then moves the second cassette gripper **355** to the drug receiving position P**1**, which is unoccupied after the first cassette gripper **351** has moved away. In this state, the shutter **322** is open to allow a picking operation to be performed on the gripped cassette Ca gripped by the second cassette gripper **355**.

[0213] As shown in FIG. **12**D, the main cassette transporter **22** returns the cassette Ca that has been placed onto the returning cassette holder **232***a* by the first cassette transporter **352** to the storage position of the cassette Ca in the cassette shelf **21**. Also, the first cassette transporter **352** moves the first cassette gripper **351** from the returning cassette holder **232***a* to the transporting cassette holder **231***a*. Subsequently, the first cassette transporter **352** causes the first cassette gripper **351** to grip the cassette Ca placed on the transporting cassette holder **231***a*.

[0214] Subsequently, as shown in FIG. **12**E, the first cassette transporter **352** moves the first cassette gripper **351** gripping the cassette Ca to the standby position P**2**, and waits until the picking operation on the gripped cassette Ca gripped by the second cassette gripper **355** is complete. Also, during the picking operation on the cassette Ca gripped by the second cassette gripper **355**, the main cassette transporter **22** places another cassette Ca onto the transporting cassette holder **231***b*.

[0215] In response to completion of the picking operation on the cassette Ca gripped by the second cassette gripper **355** and the drug determiner **124** determining that the type and the quantity of drug sheets placed into the drug port **331** are correct, the shutter **322** is closed. In response to the shutter **322** being closed, as shown in FIG. **12**F, the second cassette transporter **356** first moves the second cassette gripper **355** to the returning cassette holder **232***b*, and places the cassette Ca gripped by the second cassette gripper **355** onto the returning cassette holder **232***b*. Also, the first cassette transporter **352** moves the first cassette gripper **351** to the drug receiving position P**1**, which is unoccupied after the second cassette gripper **355** has moved away. In this state, the shutter **322** is open to allow a picking operation to be performed on the cassette Ca gripped by the first cassette gripper **351**.

[0216] As shown in FIG. **12**G, the main cassette transporter **22** returns the cassette Ca that has been placed onto the returning cassette holder **232***b* by the second cassette transporter **356** to the storage position of the cassette Ca in the cassette shelf **21**. Also, the second cassette transporter **356** moves the second cassette gripper **355** from the returning cassette holder **232***b* to the transporting cassette holder **231***b*. Subsequently, the second cassette transporter **356** causes the second cassette gripper **355** to grip the cassette Ca placed on the transporting cassette holder **231***b*.

[0217] Subsequently, as shown in FIG. **12**H, the second cassette transporter **356** moves the second cassette gripper **355** gripping the cassette Ca to the standby position P**2**, and waits until the picking operation on the cassette Ca gripped by the first cassette gripper **351** is complete.

[0218] During transportation of a cassette Ca based on prescription data, the above operation is repeated until a picking operation is complete for each of all drug sheets indicated by the prescription data. For loading drug sheets sequentially, the above operation is also repeated until a loading operation may also be complete for all the drug sheets.

[0219] In FIGS. **12**E and **12**F, when the second cassette gripper **355** is not at the drug receiving position P**1**, the first cassette transporter **352** may transport the first cassette gripper **351** directly to the drug receiving position P**1**. Similarly, when the first cassette gripper **351** is not at the drug receiving position P**1**, in FIGS. **12**G and **12**H, the second cassette transporter **356** may transport the second cassette gripper **355** directly to the drug receiving position P**1**.

[0220] In this manner, the first picking cassette transporter **35***a* and the second picking cassette transporter **35***b* transport a cassette Ca from which or into which drug sheets are to be removed or loaded to the drug receiving position P**1**. Also, when another cassette Ca is at the drug receiving position P**1**, the first picking cassette transporter **35***a* and the second picking cassette transporter **35***b* transport a cassette Ca from which or into which drug sheets are to be removed or loaded following the other cassette Ca to the standby position P**2** at which the cassette Ca is to be on standby.

[0221] More specifically, the first cassette gripper **351** and the second cassette gripper **355** grip a cassette Ca drawn from the cassette holder **23**, and transport the cassette Ca between the cassette holder **23**, the drug receiving position P**1**, and the standby position P**2**. The first cassette gripper **351** and the second cassette gripper **355** move to avoid hitting each other.

[0222] This allows an operation on a cassette Ca at the drug receiving position P**1**, and also allows another cassette Ca to be handled following the current cassette Ca to be on standby at the standby position P**2** adjacent to the drug receiving position P**1**. Thus, the operation on the cassette Ca complete at the drug receiving position P**1** is followed by the cassette Ca at the standby position P**2** transported to the drug receiving position P**1**. This allows the user to perform operations on multiple cassettes Ca more efficiently.

[0223] Thus, the picking unit **3** can efficiently deliver a cassette Ca to a user who removes or loads drug sheets from or into the cassette Ca.

Example Operation of Shutter **322**

[0224] An example operation of the shutter **322** will now be described with reference to FIGS. **13**A to **13**C. FIGS. **13**A to **13**C are diagrams describing an example operation of the shutter **322**.

[0225] As described above, the shutter **322** is open and closed as controlled by the shutter controller **122**. More specifically, as shown in FIG. **13**A, the shutter controller **122** controls the shutter **322** to be closed when no cassette Ca is at the drug receiver **32** (specifically, the drug receiving position P**1**). As shown in FIGS. **13**B and **13**C, the shutter controller **122** opens the shutter **322** after the picking cassette transporter **35** stops transporting the cassette Ca at the drug receiving position P**1**. This allows the user to perform a drug sheet picking or loading operation on the cassette Ca.

[0226] The picking-cassette transporter controller **121** and the shutter controller **122** can specify the type of each cassette Ca, and the correspondence between each storage position in the cassette Ca and the type of drug sheets to be stored at each storage position in the cassette Ca. For a cassette Ca with no partition (e.g., a small cassette Ca**3**), the picking-cassette transporter controller **121** and the shutter controller **122** specify the cassette Ca to store drug sheets of a single type alone. The picking-cassette transporter controller **121** first moves the cassette Ca to cause its middle portion to be in substantially the middle of the slot **321**. The shutter controller **122** then fully opens the shutter **322** as shown in FIG. **13**B.

[0227] For a cassette Ca with one or more partitions (e.g., a large cassette Ca**1** or a medium-sized cassette Ca**2**), the picking-cassette transporter controller **121** transports the cassette Ca to have the storage position of drug sheets to be dispensed or loaded in substantially the middle of the slot **321**. Subsequently, the shutter controller **122** opens the shutter **322** by the degree corresponding to the

width of the compartment storing drug sheets as shown in FIG. **13**C.

[0228] In this manner, the opening degree of the shutter **322** can be varied in accordance with the type of the cassette Ca transported to the drug receiving position P**1**.

[0229] When drug sheets to be dispensed or loaded next are contained in the same cassette Ca as the drug sheets currently being dispensed or loaded, the position of the current cassette Ca is simply to be changed, without the cassette Ca being replaced with another cassette Ca. In this case, the shutter controller **122** closes the shutter **322** after the drug sheets are dispensed from or loaded into the current cassette Ca. The picking-cassette transporter controller **121** then moves the cassette Ca to cause the storage position of drug sheets to be dispensed or loaded next to be in substantially the middle of the slot **321**. The shutter controller **122** then opens the shutter **322** by the degree corresponding to the width of the compartment for storing the drug sheets to be dispensed or loaded next.

[0230] Drug sheets that are likely to be dispensed at a time may be contained in the same cassette Ca having one or more partitions to allow such drug sheets to be dispensed more efficiently.

[0231] In the example described above, the cassette Ca is transported to cause the storage position accessed by the user to be in substantially the middle of the slot **321**, and the shutter **322** is then open in substantially the middle of the slot **321**. In some embodiments, a cassette Ca having one or more partitions may be transported to cause its middle portion to be in substantially the middle of the slot **321**, and the shutter **322** may then be open in a stepwise manner at the storage position in the cassette Ca accessed by the user.

Structure of Drug Dispenser

[0232] An example structure of the drug dispenser **33** will now be described with reference to FIG. **14**. FIG. **14** is a cross-sectional view of the drug dispenser **33** showing its example structure.

[0233] As shown in FIG. **14**, the worktable **36** has the drug port **331**, above which the image sensor **335** is placed. The drug transporter **332** is located below the drug port **331**.

[0234] The drug transporter **332** operates to cause drug sheets placed through the drug port **331** to drop toward the upper shutter **333**. In the present embodiment, the drug transporter **332** includes a belt conveyor that rotates with rotational shafts **332***a* in the direction indicated by arrow Arr shown in FIG. **14**. Also, the measuring unit **336** (load cell) is immediately below the drug transporter **332**, allowing the measurement of drug sheets placed on the drug transporter **332**.

[0235] The upper shutter **333** is located below the drug transporter **332** to receive drug sheets that drop from the drug transporter **332**. The upper shutter **333** is open and closed in the horizontal direction (in the width direction of the picking unit **3** in the present embodiment, or X-direction). The lower shutter **334** is located below the upper shutter **333** to receive drug sheets that drop from the upper shutter **333**. The lower shutter **334** is open and closed in the horizontal direction (in X-direction in the present embodiment). In this structure, the upper shutter **333** and the lower shutter **334** that are closed can temporarily hold drug sheets. The upper shutter **333** is open to cause drug sheets to drop onto the lower shutter **334**. The lower shutter **334** is open to cause drug sheets to drop onto the transportation tray Tr.

[0236] In the initial state, the upper shutter **333** is open, and the lower shutter **334** is closed.

[0237] The drug dispenser **33** includes a lower shutter drive **334***a* that moves the lower shutter **334** in the horizontal direction (X-direction). More specifically, the lower shutter drive **334***a* includes a compartment **3341** having the lower shutter **334** on the bottom, and a beam **3342** that allows the compartment **3341** to be slidable in X-direction. The compartment **3341** is movable in X-direction to allow drug sheets received immediately below the upper shutter **333** to drop at a position on the transportation tray Tr different from the position at which the drug sheets have been received.

[0238] More specifically, the lower shutter drive **334***a* can adjust the relative positions of the lower shutter **334** and the transportation tray Tr in X-direction. This allows drug sheets to drop at an intended position on the transportation tray Tr. The above relative positions may also be adjusted by the tray transporter **6** moving the transportation tray Tr.

[0239] The drug dispenser controller **123** controls the image sensor **335** in response to, for example, drug sheets placed into the drug port **331** and the measuring unit **336** starting to measure the drug sheet quantity. The image sensor **335** then captures an image of the drug sheets. The drug determiner **124** determines, based on the image of the drug sheets captured by the image sensor **335** and the weight of the drug sheets measured by the measuring unit **336**, as well as prescription data, whether the drug sheets placed into the drug port **331** are the correct drug sheets to be dispensed based on the prescription data.

[0240] When determining that the drug sheets placed into the drug port **331** are correct, the drug determiner **124** determines whether any drugs contained in any of the drug sheets are prone to damage (e.g., prone to dents) based on the type of each drug sheet. When the drug determiner **124** finds any drug sheet containing a drug prone to damage, the drug dispenser controller **123** closes the upper shutter **333** and then operates the drug transporter **332** to cause the drug sheets to drop onto the upper shutter **333** that is closed. After a predetermined time (the time enough to allow the drug sheets placed on the drug transporter **332** to drop completely), the drug dispenser controller **123** opens the upper shutter **333** to cause the drug sheets to drop onto the lower shutter **334** that is closed.

[0241] When the drug determiner **124** finds no such drug sheets containing a drug prone to damage, the drug dispenser controller **123** maintains the upper shutter **333** to be open and operates the drug transporter **332** to cause the drug sheets to drop onto the lower shutter **334** that is closed.

[0242] In this manner, the upper shutter **333** reduces damage to a drug prone to damage that may result from dropping from the drug transporter **332**. Drug sheets containing no drug prone to damage are dropped from the drug transporter **332** directly onto the lower shutter **334**. This saves time to be taken by the upper shutter **333** to temporarily hold such drug sheets.

[0243] The transportation tray Tr onto which drug sheets are to be dispensed as indicated by prescription data is transported by the tray transporter **6** and is located below the lower shutter **334**. In this state, the drug dispenser controller **123** controls the lower shutter drive **334***a*. This moves the lower shutter **334** to above the transportation tray Tr to receive drug sheets. The drug dispenser controller **123** then opens the lower shutter **334** to allow the drug sheets to drop onto the transportation tray Tr.

[0244] The drug dispenser controller **123** and the transporter controller **13** control the positions of the lower shutter **334** and the transportation tray Tr to allow different types of drug sheets to be received at different positions on the transportation tray Tr. For example, the drug dispenser controller **123** positions the lower shutter **334** in X-direction, whereas the transporter controller **13** positions the transportation tray Tr in Y-direction. The control unit **10** determines the positions to which the drug sheets drop to align the drug sheets in the order of being dispensed as indicated by prescription data.

Processing in Main Unit and Picking Unit

[0245] The processing performed in the main unit **2** and the picking unit **3** will now be described with reference to FIGS. **15** and **16**. FIG. **15** is a flowchart showing an example process performed by the main unit **2** and the picking unit **3** for dispensing drug sheets onto the transportation tray Tr. FIG. **16** is a flowchart showing an example process performed by the main unit **2** and the picking unit **3** for loading drug sheets into the cassette Ca.

Dispensing Drug Sheets

[0246] For dispensing drug sheets onto the transportation tray Tr, as shown in FIG. **15**, the control unit **10** first receives input prescription data (or a user input). In the main unit **2**, the cassette specifier **111** refers to the memory **15** to specify a cassette Ca containing drug sheets indicated by the prescription data (SA**1**). The cassette specifier **111** also specifies the storage position of the cassette Ca in the cassette shelf **21**.

[0247] The main-cassette transporter controller **112** controls the first main cassette transporter **22***a* to move the first cassette gripper **221***a* to the storage position specified by the cassette specifier

111. When determining that the first cassette gripper **221***a* is located immediately in front of the cassette Ca specified by the cassette specifier **111** based on the detection result obtained by the position sensor **2214**, the main-cassette transporter controller **112** removes the cassette Ca from the cassette shelf **21**. The main-cassette transporter controller **112** then transports the removed cassette Ca to the transporting cassette holder **231** (SA**2**). In this state, the RFID reader reads the tab receiver identification information from the RFID tag included in the cassette Ca, and transmits the tab receiver identification information to the picking unit controller **12**.

[0248] Also, the cassette specifier **111** determines whether the specified cassette Ca is a last cassette containing a last drug sheet indicated by the prescription data (SA**3**). In response to the cassette specifier **111** determining that the current cassette Ca is not the last cassette (No in SA**3**), the processing returns to step SA**1**. In this state, the main-cassette transporter controller **112** controls the second main cassette transporter **22***b* to move the second cassette gripper **221***b* to the storage position specified by the cassette specifier **111**. In this manner, in response to every cassette Ca specified by the cassette specifier **111**, the first main cassette transporter **22***a* and the second main cassette transporter **22***b* are driven alternately for efficient removal of the cassette Ca. In response to the cassette specifier **111** determining that the current cassette Ca is the last cassette (Yes in SA**3**), the processing advances to step SA**5**.

[0249] In the main unit **2**, when the cassette Ca is returned to the returning cassette holder **232** by the picking-cassette transporter controller **121**, the main-cassette transporter controller **112** controls the first cassette gripper **221***a* or the second cassette gripper **221***b* to remove the cassette Ca from the returning cassette holder **232**.

[0250] For example, the main-cassette transporter controller **112** first transports the cassette Ca to the transporting cassette holder **231**, and then moves the first cassette gripper **221***a* or the second cassette gripper **221***b* to the returning cassette holder **232**. After the cassette Ca is placed onto the returning cassette holder **232** and then the picking cassette transporter **35** moves away from the returning cassette holder **232**, the main-cassette transporter controller **112** removes the cassette Ca from the returning cassette holder **232**.

[0251] The main-cassette transporter controller **112** specifies the storage position of the cassette Ca removed from the returning cassette holder **232** by referring to the memory **15**, and controls the first main cassette transporter **22***a* or the second main cassette transporter **22***b* to return the cassette Ca to the storage position (SA**4**).

[0252] Also, the cassette specifier **111** determines whether the cassette Ca to be returned to the cassette shelf **21** is the last cassette (SA**5**). In response to the cassette specifier **111** determining that the cassette Ca is not the last cassette (No in SA**5**), the processing returns to step SA**4**. In response to the cassette specifier **111** determining that the cassette Ca is the last cassette (Yes in SA**5**), the process ends.

[0253] After the cassette Ca is placed onto the transporting cassette holder **231** and then the main cassette transporter **22** moves away from the transporting cassette holder **231** through the processing in step SA**2**, the picking-cassette transporter controller **121** in the picking unit **3** controls the first picking cassette transporter **35***a* or the second picking cassette transporter **35***b* to transport the cassette Ca placed on the transporting cassette holder **231** to the standby position P**2** (SB**1**), and then to the drug receiving position P**1** (SB**2**).

[0254] When another cassette Ca is already at the drug receiving position P**1**, the picking-cassette transporter controller **121** transports the current cassette Ca to the standby position P**2**. In other words, when no other cassette Ca is at the drug receiving position P**1**, the picking-cassette transporter controller **121** may transport the cassette Ca directly from the transporting cassette holder **231** to the drug receiving position P**1**.

[0255] In response to the current cassette Ca being placed at the drug receiving position P**1**, the shutter controller **122** opens the shutter **322** (SB**3**).

[0256] When drug sheets are to be dispensed from any cassette Ca having one or more partitions,

the picking-cassette transporter controller **121** specifies the orientation of the cassette Ca at the drug receiving position P**1** based on (1) the tab receiver identification information read by the RFID reader and (2) data associating the storage position information and the drug identification information stored in the memory **15**. In other words, the picking-cassette transporter controller **121** specifies the storage position of each type of drug sheet in the cassette Ca when the cassette Ca is at the drug receiving position P**1**. Subsequently, the picking-cassette transporter controller **121** moves the cassette Ca to cause the storage position of drug sheets to be dispensed to be in substantially the middle of the slot **321** based on the specified storage position. The shutter controller **122** then controls the shutter **322** to open partially at the storage position.

[0257] While the shutter **322** is open, the user removes drug sheets in the quantity appearing on the second touchscreen **31**, and places the removed drug sheets into the drug port **331**. The measuring unit **336** starts measuring the drug sheet quantity. The drug dispenser controller **123** controls the image sensor **335** to capture an image of the drug sheets placed into the drug port **331** (SB**4**). In some embodiments, the image sensor **335** may start capturing an image and the measuring unit **336** may start measuring the drug sheet quantity in response to a user input received on the second touchscreen **31** indicating completion of the drug sheet placement into the drug port **331**.

[0258] The drug determiner **124** determines whether the type and the quantity of the drug sheets placed into the drug port **331** match the type and the quantity indicated by the prescription data based on the image captured by the image sensor **335** and the quantity measured by the measuring unit **336** (SB**5**). When a mismatch is found (No in SB**5**), the touchscreen controller **14** causes an error message to appear on the second touchscreen **31** indicating that the type or the quantity of drug sheets placed is incorrect (SB**11**). This may include a message to prompt placement of drug sheets again.

[0259] When a match is found (Yes in SB**5**), the drug dispenser controller **123** controls the opening and closing operation of the upper shutter **333** and the lower shutter **334** (SB**6**).

[0260] More specifically, in response to the drug determiner **124** determining that the drug sheets are prone to damage, the drug dispenser controller **123** closes the upper shutter **333** and then operates the drug transporter **332** to cause the drug sheets to drop onto the upper shutter **333** that is closed. Subsequently, the drug dispenser controller **123** opens the upper shutter **333** and then opens the lower shutter **334** to allow the drug sheets to drop onto the transportation tray Tr. The drug dispenser controller **123** opens the lower shutter **334** after the relative positions of the lower shutter **334** and the transportation tray Tr are adjusted.

[0261] In response to the drug determiner **124** determining that the drug sheets are not prone to damage, the drug dispenser controller **123** maintains the upper shutter **333** to be open and operates the drug transporter **332** to cause the drug sheets to drop onto the lower shutter **334** that is closed. After the relative positions of the lower shutter **334** and the transportation tray Tr are adjusted, the drug dispenser controller **123** opens the lower shutter **334** to allow the drug sheets to drop onto the transportation tray Tr.

[0262] When a match is found (or Yes) in step SB**5**, the shutter controller **122** closes the shutter **322** (SB**7**). The picking-cassette transporter controller **121** controls the first picking cassette transporter **35***a* or the second picking cassette transporter **35***b* to transport the cassette Ca at the drug receiving position P**1** to the returning cassette holder **232** (SB**8**).

[0263] Subsequently, the picking-cassette transporter controller **121** returns to the processing in steps SB**1** and SB**2**. More specifically, the picking-cassette transporter controller **121** controls the picking cassette transporter **35** that has returned the cassette Ca to the returning cassette holder **232** to transport the cassette Ca placed on the transporting cassette holder **231** to the standby position P**2**. Also, the picking-cassette transporter controller **121** controls the picking cassette transporter **35** that has placed the cassette Ca to be on standby at the standby position P**2** to transport the cassette Ca to the drug receiving position P**1**.

[0264] Also, when the cassette Ca from which drug sheets have been dispensed also contains drug

sheets to be dispensed next, the picking-cassette transporter controller 121 moves the cassette Ca to cause the storage position of the drug sheets to be in substantially the middle of the slot 321 after the processing in step SB7. The processing then returns to step SB3.

[0265] The picking unit controller 12 repeats the above processing until the last cassette is transported to the returning cassette holder 232.

Loading of Drug Sheets

[0266] For loading drug sheets into a cassette Ca, as shown in FIG. 16, the barcode reader 34 in the picking unit 3 reads drug identification information for drug sheets to be loaded (SB21). In the main unit 2, the cassette specifier 111 specifies a cassette Ca into which drug sheets are to be loaded by referring to the memory 15 based on prescription data (SA21). The cassette specifier 111 also specifies the storage position of the cassette Ca in the cassette shelf 21.

[0267] In the same manner as in step SA2, the main-cassette transporter controller 112 controls the main cassette transporter 22 to remove the cassette Ca specified by the cassette specifier 111 from the cassette shelf 21 and to transport the cassette Ca to the transporting cassette holder 231 (SA22).

[0268] After the cassette Ca is placed onto the transporting cassette holder 231 and then the main cassette transporter 22 moves away from the transporting cassette holder 231, the picking-cassette transporter controller 121 in the picking unit 3 controls the picking cassette transporter 35 to transport the cassette Ca placed on the transporting cassette holder 231 to the drug receiving position P1 (SB22).

[0269] In response to the current cassette Ca being placed at the drug receiving position P1, the shutter controller 122 opens the shutter 322 (SB23). When drug sheets to be loaded are to be stored in any cassette Ca having one or more partitions, the cassette Ca is positioned and the opening operation of the shutter 322 is controlled to cause the shutter 322 to be open partially at the storage position of the drug sheets.

[0270] Subsequently, in response to a user input on the second touchscreen 31 indicating that the loading is complete (SB24), the shutter controller 122 closes the shutter 322 (SB25). Subsequently, the picking-cassette transporter controller 121 controls the main cassette transporter 22 to transport the cassette Ca at the drug receiving position P1 to the returning cassette holder 232 (SB26).

[0271] The main-cassette transporter controller 112 in the main unit 2 then returns the cassette Ca to its storage position in the same manner as in step SA4 (SA23).

SUMMARY

[0272] As described above, the picking unit 3 transports a cassette Ca to the drug receiver 32 based on prescription data (or a user input) and the determination result obtained by the drug determiner 124 and opens or closes the shutter 322. The user working at the picking unit 3 can thus simply remove drug sheets from the cassette Ca when the shutter 322 is open, and then simply place the drug sheets into the drug port 331 without inspecting the drug sheets (without checking the drug sheet type).

[0273] Thus, the operations at the picking unit 3 can be allocated to an uncertified user, rather than to a qualified user, allowing other operations to be allocated to a qualified user who is freed from the picking operation.

[0274] As described above, a qualified user conducts a final inspection at the inspection unit 4 downstream from the picking unit 3. This increases the reliability and accuracy of the operations at the picking unit 3.

Second Embodiment

[0275] A second embodiment of the present disclosure will now be described mainly with reference to FIGS. 17 to 30. For ease of explanation, the components having the same functions as the components described in the above embodiment are given the same reference numerals as those components, and will not be described. The same applies to other embodiments.

[0276] In the present embodiment, screen images to appear in the procedures taken at the drug station herein will be described. In the present embodiment, example screen images to appear in the

procedures taken at a drug station **1** (or a drug station **1**A in a third embodiment) will be described.

[0277] Similarly to the second touchscreen **31**, the first touchscreen **5** is provided for each picking unit **3** (or the picking unit **3**A in the third embodiment). The first touchscreen **5** displays various items of information about the entire drug station **1** as well as various items of information about the corresponding picking unit **3**. Also, the first touchscreen **5** receives various input operations associated with the overall processes performed at the drug station **1** as well as with processes performed at the corresponding picking unit **3**. The second touchscreen **31** displays various screen images or receives input operations associated with the operations for removing or loading drugs at the corresponding picking unit **3**.

[0278] More specifically, the first touchscreen **5** and the second touchscreen **31** each function as a touchscreen including a display device (display unit) for displaying the above items of information or screen images and an input device (operation unit) for receiving the above input operations. In the above example, the display screen of the display device included in the first touchscreen **5** functions as a main screen, whereas the display screen of the display device included in the second touchscreen **31** functions as a sub-screen.

[0279] Example screen images to appear on the first touchscreen **5** and the second touchscreen **31** included in one picking unit **3** will be described below. In the examples described below, the functions of the control unit **10** are implemented by a personal computer (PC) **301** (refer to FIG. **28**) included in each picking unit **3**.

[0280] For automated drug dispensing, or dispensing drugs in the order indicated by prescription data received by the control unit **10**, the first drug receiver **32***a*, and the picking cassette transporter **35** below the first drug receiver **32***a* are used as in the first embodiment (refer to FIG. **9**). The second drug receiver **32***b*, and the picking cassette transporter **35** below the second drug receiver **32***b* are used for selected drug dispensing, or dispensing selected drugs as an interrupt during the automated drug dispensing operation performed in the order of reception of prescription data. The same applies to the third embodiment.

Example Screen Images on First Touchscreen

[0281] Example screen images to appear on the first touchscreen **5** will now be described. FIGS. **17** to **21** are diagrams of example screen images to appear on the first touchscreen **5**.

At Activation of Drug Station

[0282] In response to the drug station **1** being activated, the touchscreen controller **14** causes a login screen image to appear on the first touchscreen **5**. In response to an input of a user ID (operator ID) and a password on the login screen image and an input operation on a login button on the login screen image, the touchscreen controller **14** performs matching using the operator ID and the password. In response to successful matching, the touchscreen controller **14** causes a main screen image shown in FIG. **17** to appear on the first touchscreen **5**.

Screen Image for Automated Dispensing (Dispensing List)

[0283] FIG. **17** is a diagram of an example main screen image. In the present embodiment, the touchscreen controller **14** causes an automated dispensing screen image (automated dispensing screen image **17001**) to appear as its main screen image.

[0284] The automated dispensing screen image **17001** includes, for example, a menu area A**11**, a loading indication area A**12**, a dispensing cancel button A**13**, a logout button A**14**, a settings button A**15**, and an end button A**16**. These areas and buttons are also included in an automated dispensing screen image **18001**, a selected dispensing screen image **19001**, a loading screen image **20001**, and a log view screen image **21001**. During loading of drugs in forms such as drug sheets, creams, or eyedrops, no drug dispensing operation is performed. The loading screen image **20001** thus does not include the dispensing cancel button A**13**.

[0285] The menu area A**11** displays various menu buttons. In this example, the menu area A**11** displays an automated dispense button A**111**, a selected dispense button A**112**, a load button A**113**, a statistics/log view button A**114**, and a master profile button A**115**. The touchscreen controller **14**

displays a screen image in response to a selected button.

[0286] In response to the automated dispense button A**111** being selected, for example, the automated dispensing screen image **17001** shown in FIG. **17** or the automated dispensing screen image **18001** shown in FIG. **18** appears. In response to the selected dispense button A**112** being selected, for example, the selected dispensing screen image **19001** shown in FIG. **19** appears. In response to the load button A**113** being selected, for example, the loading screen image **20001** shown in FIG. **20** appears. In response to the statistics/log view button A**114** being selected, for example, the log view screen image **21001** shown in FIG. **21** appears. In response to the master profile button A**115** being selected, a screen image for entry of the drug type, the user name, and other information appears.

[0287] The loading indication area A**12** indicates whether any cassette Ca is to receive drug loading. The memory **15** may manage drug identification information identifying information about one or more drugs contained in each cassette Ca and drug quantity information indicating the quantity of drugs contained in each cassette Ca in a manner associated with cassette identification information (or storage position information) about each cassette Ca in the main unit **2**. When finding any cassette Ca with the drug quantity of 0 or less than a reference value (a predetermined reference inventory value) by referring to the drug quantity information, the touchscreen controller **14** causes an indication about the cassette Ca to appear in the loading indication area A**12**. When finding no such cassette Ca, the touchscreen controller **14** causes no indication to appear in the loading indication area A**12**.

[0288] The dispensing cancel button A**13** appears during dispensing of drugs to receive an input operation for canceling the drug dispensing operation. The logout button A**14** receives an input operation for logging out. During any drug dispensing operation, the logout button A**14** displays the name of the user who has logged in. The settings button A**15** receives an input operation for various settings. The end button A**16** receives an input operation for either ending the application for implementing various processes at the drug station **1** or for shutting down the control unit **10**.

[0289] The automated dispensing screen image **17001** further includes a dispensing list select button A**17**, a picking list select button A**18**, a search item input area A**19**, a dispensing list display area A**20**, a dispensed-drug display button A**21**, and a delete button A**22**.

[0290] In response to an input operation on the dispensing list select button A**17**, the touchscreen controller **14** causes the automated dispensing screen image **17001** including the dispensing list display area A**20** to appear. In response to an input operation on the picking list select button A**18**, the touchscreen controller **14** causes the automated dispensing screen image **18001** (refer to FIG. **18**) including a picking list display area A**31** to appear.

[0291] The search item input area A**19** receives an input operation for retrieving information to appear in the dispensing list display area A**20**.

[0292] A first refine search area A**191** receives an input operation for displaying, in the dispensing list display area A**20**, the dispensing status (status) of drugs indicated by prescription data allocated to the picking unit **3** including the first touchscreen **5**. The control unit **10** manages, for each picking unit **3**, the names of patients allocated, their prescription data, the order of reception of the prescription data, and the dispensing status of their drugs.

[0293] In response to the above input operation, the touchscreen controller **14** places a checkmark in the checkbox for the first refine search area A**191**. The touchscreen controller **14** also displays, in the dispensing list display area A**20**, the dispensing status of drugs indicated by the prescription data allocated to the picking unit **3** including the first touchscreen **5**.

[0294] A second refine search area A**192** can receive an input of a patient name. In response to an input of characters in the second refine search area A**192**, the touchscreen controller **14** searches a patient including the input characters and displays the dispensing status of drugs for the patient in the dispensing list display area A**20**.

[0295] A third refine search area A**193** receives an input operation for retrieving, from sets of

prescription data received by the control unit **10**, one or more sets of prescription data indicating drugs to be individually packed or drugs to be manually packed, and displaying, in the dispensing list display area A**20**, information about the retrieved sets of data. Such drugs are to be individually packed by a drug packer or to be packed manually after being dispensed from the drug station **1**. The prescription data includes information about such drugs.

[0296] In response to the above input operation, the touchscreen controller **14** places a checkmark in the checkbox for the third refine search area A**193**. Also, the touchscreen controller **14** displays the dispensing status of drugs to be individually packed or drugs to be packed manually in a subsequent process in the dispensing list display area A**20**.

[0297] A fourth refine search area A**194** receives an input operation for retrieving, from sets of prescription data received by the control unit **10**, one or more sets of prescription data indicating any drug with a quantity including separate drug pieces, and displaying, in the dispensing list display area A**20**, information about the retrieved sets of data.

[0298] In response to the above input operation, the touchscreen controller **14** places a checkmark in the checkbox for the fourth refine search area A**194**. Also, the touchscreen controller **14** displays the dispensing status of a drug with a quantity including separate drug pieces in the dispensing list display area A**20**. More specifically, the touchscreen controller **14** displays, in the dispensing list display area A**20**, a drug list of drugs to be dispensed based on sets of prescription data (patients) including separate drug pieces.

[0299] A fifth refine search area A**195** receives an input operation for retrieving, from sets of prescription data received by the control unit **10**, one or more sets of prescription data indicating three or more types of drugs, and displaying, in the dispensing list display area A**20**, information about the retrieved sets of data.

[0300] In response to the above input operation, the touchscreen controller **14** places a checkmark in the checkbox for the fifth refine search area A**195**. Also, the touchscreen controller **14** displays the dispensing status of drugs for patients for which three or more types of drugs are to be dispensed in the dispensing list display area A**20**. More specifically, the touchscreen controller **14** displays, in the dispensing list display area A**20**, a list of drugs to be dispensed for sets of prescription data (patients) indicating three or more types of drugs.

[0301] A clear button A**196** receives an input operation for clearing the input search conditions in the first to fifth refine search areas A**191** to A**195**.

[0302] In the example shown in FIG. **17**, none of the first to fifth refine search areas A**191** to A**195** has received an input operation. Thus, in the example shown in FIG. **17**, the touchscreen controller **14** has not places a checkmark in the checkbox for any of these refine search areas, and instead displays the dispensing status of drugs based on all sets of prescription data received by the drug station **1**.

[0303] The touchscreen controller **14** also uses the other machine preparation field in the dispensing list display area A**20**. The other machine preparation field displays the type of any drug to be prepared by a preparation machine other than the drug station **1** (e.g., a drug packer). The other machine preparation field also displays whether the drug preparation has been complete. The memory **15** manages information about whether any drug is to be prepared and whether the drug preparation has been complete for each type of drug. In FIG. **17**, Narc represents narcotics, Liquid represents liquid drugs, and Packed represents drugs to be individually packed. Further, the circle sign means that the drug has been already prepared at another dispensing machine, and the cross sign means that the drug has not yet been prepared at another dispensing machine.

[0304] The dispensing list display area A**20** displays information indicating the dispensing status of drugs (dispense-data) for each patient. In the example shown in FIG. **17**, the dispensing list display area A**20** displays the dispensing status of drugs for each patient in the order of patients to receive dispensed drugs. The dispensing list display area A**20** includes, for example, an entry number field indicating the turn for each patient for which drugs are to be dispensed, a patient name field

indicating the name of each patient, and a status field indicating the dispensing status of drugs. The dispensing list display area A**20** further includes a waiting time field indicating a waiting time expected after prescription data is entered, as managed by the control unit **10**. The dispensing list display area A**20** further displays a list of drugs to be dispensed based on the search conditions depending on whether an input operation has been performed in the first to fifth refine search areas A**191** to A**195**.

[0305] Also, the dispensed-drug display button A**21** receives an input operation for displaying information for each patient for which the drug dispensing has been complete. In response to an input operation on the dispensed-drug display button A**21**, the touchscreen controller **14** displays information for each patient for which the drug dispensing has been complete in the dispensing list display area A**20**. Also, the delete button A**22** receives an input operation for deleting dispense-data for any patient appearing in the dispensing list display area A**20**. In response to an input operation on the delete button A**22** with information for a patient appearing in the dispensing list display area A**20** is selected (entry number **5** is selected in FIG. **17**), the touchscreen controller **14** deletes dispense-data for the selected patient from the dispensing list display area A**20**.

Screen Image for Automated Dispensing (Picking List)

[0306] FIG. **18** is a diagram of an example automated dispensing screen image **18001**. The automated dispensing screen image **18001** includes the picking list display area A**31** and a next dispensing information display area A**32**. The picking list display area A**31** displays information about each type of drug to be dispensed. In the example shown in FIG. **18**, the picking list display area A**31** displays information about each type of drug to be dispensed in the order of drugs to be dispensed.

[0307] The picking list display area A**31** includes, for example, an entry number field indicating the turn for each drug to be dispensed, a drug name field indicating the name of each drug, a drug form field indicating the form of each drug, and a total quantity field indicating the total quantity of each drug to be dispensed. The picking list display area A**31** includes, for example, a recipient field indicating the name of each patient for which the drug is to be dispensed, the completion time field indicating an expected time to be taken before the drug dispensing is complete, and a status field indicating various relevant situations.

[0308] The memory **15** stores information about the form of each drug in a manner associated with, for example, drug identification information. The completion time field displays, for example, a time calculated by the control unit **10** based on an expected time to be taken to dispense each type of drug stored in the memory **15**. The status field displays, for example, information indicating a drug expected to be out of stock when being dispensed from a cassette Ca, and information indicating a drug to be dispensed as an interrupt during an automated drug dispensing operation performed in the order of reception of prescription data. The status field displays information based on relevant information managed by the control unit **10** including information about the quantity of each drug contained in a cassette Ca and information about reception of a request for selectively dispensing each drug.

[0309] Information indicating a drug expected to be out of stock is obtained and displayed in the manner described below. The control unit **10** subtracts, for the same single type of drug indicated by each received set of prescription data, the quantity of the drug to be dispensed (appearing in the total quantity field) from the total quantity of the drug stored in the main unit **2** in the order of dispensing. The control unit **10** displays information indicating the drug expected to be out of stock (Out of stock in the figure) for dispense-data with the resultant difference being 0 or less in the order of drug dispensing. More specifically, the touchscreen controller **14** displays information indicating the drug to be out of stock for dispense-data about the drug expected to be out of stock when being dispensed based on the order of drug dispensing.

[0310] The control unit **10** manages the dispensing status of each drug to allow the touchscreen controller **14** to display, for example, the remaining number of drugs to be dispensed (To be picked

in the figure) and the number of drugs already dispensed (Picked in the figure). This display allows the user (operator) to view the dispensing status of drugs (progress) at the entire drug station **1**.

[0311] The next dispensing information display area A**32** displays information about a drug to be dispensed next to the drug currently being dispensed (or being picked). The next dispensing information display area A**32** displays, for example, the name and the image of the drug to be dispensed next, the cassette number for a cassette Ca containing the drug, and the quantity of the drug (inventory value) contained in the cassette Ca. For any family cassettes available for the drug, the next dispensing information display area A**32** displays the cassette number for any cassette Ca to be a family cassette and the quantity of the drug contained in the cassette Ca. The family cassettes refer to a group of cassettes Ca containing the drug of the same type. In this example, the next dispensing information display area A**32** further displays the inventory value in the shelf for the drug of the same type as the drug contained in the family cassette. The inventory in the shelf indicates the quantity of the drug of the same type managed in, for example, a drug shelf other than the drug shelf included in the main unit **2** at, for example, the pharmacy at which the drug station **1** is installed.

[0312] The cassette number of the family cassette appears for the user to determine, when finding a cassette Ca containing any drug to be out of stock during drug dispensing, whether another cassette Ca containing the same drug can be called and used to load the cassette Ca with the drug out of stock. The same applies to the quantity of the drug contained in each cassette Ca to be a family cassette. The inventory value in the shelf appears for the user to determine, when finding a cassette Ca containing any drug to be out of stock during drug dispensing, whether the cassette Ca can be loaded from the inventory in the shelf.

[0313] The memory **15** stores an image of each drug in a manner associated with drug identification information. For each drug type, cassettes Ca containing the same type of drug have information (flag) indicating that the cassettes Ca are family cassettes. Also, the touchscreen controller **14** obtains information about each drug to be managed in the inventory in the shelf (e.g., the drug type, the storage position, or the quantity) from a storage management system (not shown) that manages information about each drug to be delivered to, for example, a pharmacy.

Selected Dispensing Screen Image

[0314] FIG. **19** is a diagram of an example selected dispensing screen image **19001**. The selected dispensing screen image **19001** receives an input operation for dispensing selected drugs separately from an automated dispensing operation.

[0315] In response to the selected dispense button A**112** being selected, the touchscreen controller **14** first displays a login screen image. A user who intends to dispense selected drugs as an interrupt during any automated dispensing operation may be different from a user performing a picking operation in the automated dispensing operation. In response to successful user authentication, the touchscreen controller **14** displays, for example, the selected dispensing screen image **19001** shown in FIG. **19**.

[0316] The selected dispensing screen image **19001** includes a drug list display area A**41** and a dispensing drug display area A**42**.

[0317] The drug list display area A**41** receives an input operation for retrieving information about drugs stored in the main unit **2**, and displays information about the retrieved drugs. The drug list display area A**41** includes a first retrieval area A**411**, a second retrieval area A**412**, a retrieval result display area A**413**, and a dispensing list add button A**414**.

[0318] The first retrieval area A**411** and the second retrieval area A**412** receive an input operation for retrieving information about cassettes Ca (drugs) to appear in the retrieval result display area A**413**. With no search conditions being input, the retrieval result display area A**413** displays a list of sets of information about all drugs stored in the main unit **2** (drug list).

[0319] In response to an input operation on A**11** in the first retrieval area A**411**, the touchscreen controller **14** displays information associated with all sets of drug identification information in the

retrieval result display area A**413**. In response to an input operation on letter A, the touchscreen controller **14** retrieves and displays information associated with drug identification information about drugs with names starting from letter A in the retrieval result display area A**413**. The same applies to letter B and other letters. The second retrieval area A**412** can receive an input of a drug name. The touchscreen controller **14** retrieves information associated with drug identification information including characters input in the second retrieval area A**412**, and displays the retrieved information in the retrieval result display area A**413**.

[0320] The retrieval result display area A**413** displays, in addition to the retrieved drug name, for example, the cassette number (Cassette No. in the figure), sub-number (Sub-No. in the figure), the reference inventory value, the inventory value, the inventory value in the shelf, the lot number, and the expiry date. The sub-number indicates a storage position in a cassette Ca having one or more partitions. More specifically, the sub-number indicates storage position information. The reference inventory value is a reference value indicating a minimum quantity of drug contained in the cassette Ca. The inventory value is the quantity of each drug contained in the cassette Ca. The inventory value in the shelf is the quantity of the drug managed in, for example, a drug shelf other than the drug shelf included in the main unit **2** at, for example, a pharmacy at which the drug station **1** is installed.

[0321] The dispensing list add button A**414** receives an input operation for adding, to a dispensing list area A**421**, information about a drug selected from drugs appearing in the retrieval result display area A**413**.

[0322] The dispensing drug display area A**42** displays information about drugs to be dispensed separately from an automated dispensing operation of drugs based on prescription data. The dispensing drug display area A**42** includes, for example, the dispensing list area A**421**, an interrupt button A**422**, a cassette move button A**423**, a transportation drug display area A**424**, a dispensing quantity input area A**425**, and a confirm button A**426**.

[0323] The dispensing list area A**421** displays information about each drug selected by the user to be dispensed selectively from the drugs appearing in the retrieval result display area A**413**. In this example, the dispensing list area A**421** displays, together with the name of each selected drug, the cassette number and the sub-number of the cassette Ca containing each selected drug. The dispensing list area A**421** includes a cross sign button to be a delete button for receiving an input operation for deleting information about each selected drug.

[0324] In response to an input operation on the dispensing list add button A**414** with information about a drug being selected in the retrieval result display area A**413**, the touchscreen controller **14** displays, for example, the information about the drug in the dispensing list area A**421**. In response to a dragging operation on the dispensing list area A**421** for information about a drug being selected in the retrieval result display area A**413**, the touchscreen controller **14** may display the information about the drug in the dispensing list area A**421**.

[0325] The interrupt button A**422** receives an input operation for interrupting transportation (movement) of a cassette Ca appearing in the dispensing list area A**421**. The cassette move button A**423** receives an input operation for starting transportation of a cassette Ca appearing in the dispensing list area A**421**.

[0326] The transportation drug display area A**424** displays information about the cassette Ca transported to the drug receiver **32** in the picking unit **3** and information about the drug contained in the cassette Ca. In this example, the transportation drug display area A**424** displays the cassette number of the cassette Ca, an image of the drug contained in the cassette Ca, the lot number, and the expiry date. The user may add a drug (cassette) to the dispensing list area A**421** (dispensing list) by referring to the lot number or the expiry date.

[0327] The dispensing quantity input area A**425** can receive an input of the quantity of the drug removed from the cassette Ca transported to the drug receiver **32** or the quantity of the drug loaded into the cassette Ca. In response to an input operation in the numerical input area, the touchscreen

controller **14** displays, for example, a numerical keypad. In response to a numerical value being input with the dispense button (Dispensing quantity in the figure) being selected, the numerical number appearing in the dispensing quantity input area A**425** indicates the quantity of the drug removed (dispensed) from the cassette Ca. In response to a numerical value being input with the load button (Loading quantity in the figure) being selected, the numerical value appearing in the dispensing quantity input area A**425** indicates the quantity of the drug loaded into the cassette Ca.

[0328] To dispense a selected drug, the dispense button is selected to remove the drug from the cassette Ca. At the timing of dispensing the drug, the drug can also be loaded into the cassette Ca. The load button is thus also selectable.

[0329] In response to an input operation on the confirm button A**426** after the quantity of the drug is input in the dispensing quantity input area A**425**, the main unit controller **11** and the picking unit controller **12** return the cassette Ca transported to the drug receiver **32** to the main unit **2**. Also, the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug to be dispensed next from the main unit **2** to the drug receiver **32**. Without an input operation on the interrupt button A**422**, this operation is repeated until all the drugs appearing in the dispensing list area A**421** are dispensed.

[0330] Also, the control unit **10** subtracts the numerical value input into the dispensing quantity input area A**425** from (or add the value to) the quantity of the drug contained in the cassette Ca transported to the drug receiver **32**. The control unit **10** can thus update the quantity of the drug contained in the cassette Ca.

Loading Screen Image

[0331] FIG. **20** is a diagram of an example loading screen image **20001**. The loading screen image **20001** receives an input operation for loading any drug into the cassette Ca. In response to the load button A**113** being selected, the touchscreen controller **14** displays, for example, the loading screen image **20001** shown in FIG. **20**. In response to the load button A**113** being selected, the control unit **10** avoids allocating, to the picking unit **3** including the first touchscreen **5** that has received the input operation, a drug dispensing operation to be performed based on prescription data. In this case, the control unit **10** uses this picking unit **3** dedicated to a drug loading operation.

[0332] The loading screen image **20001** includes a loading mode select button A**61** and an inventory-taking mode select button A**62**. In response to an input operation on the loading mode select button A**61**, the touchscreen controller **14** displays, as a loading screen image **20001**, an image including a retrieval area A**63**, a first display area A**64**, and a second display area A**65**. To load a drug into a cassette Ca, the user selects the loading mode select button A**61**. In response to an input operation on the inventory-taking mode select button A**62**, the touchscreen controller **14** displays information about all cassettes Ca stored in the main unit **2** (e.g., the types, numbers, and storage positions of drugs contained in all cassettes Ca). The touchscreen controller **14** may display information about the types, numbers, and storage positions of all drugs managed in, for example, drug shelves in the main unit **2** installed at the pharmacy with the drug station **1**, as well as in drug shelves other than the drug shelves in the main unit **2**.

[0333] The retrieval area A**63** is used to retrieve drugs to be loaded. A range specification area A**631** is used to specify a range of cassette numbers. In response to an input operation on the range specification area A**631**, the touchscreen controller **14** displays information about a cassette Ca with its cassette number within the specified range in a retrieval result display area A**643**. A drug name specification area A**632** is used to specify a drug name. In response to an input of characters in the drug name specification area A**632**, the touchscreen controller **14** displays information about a cassette Ca containing a drug with a name including the input characters in the retrieval result display area A**643**.

[0334] An out of stock-drug retrieval area A**633** receives an input operation for displaying information about cassettes containing drugs out of stock in the retrieval result display area A**643**. An out of stock-cassette retrieval area A**634** receives an input operation for displaying information

about cassettes each lacking a reference inventory value in the retrieval result display area A**643**. A dead stock cassette retrieval area A**635** receives an input operation for displaying information about dead stock cassettes in the retrieval result display area A**643**.

[0335] An out of stock-cassette refers to a cassette Ca that is out of stock (with an inventory value of 0). A reference inventory lacking cassette refers to a cassette Ca containing a drug with a quantity less than a reference inventory value. A dead stock cassette refers to a cassette Ca that has not been transported for a predetermined duration (e.g., a duration of several months from the activation of the drug station **1**). The control unit **10** can identify a dead stock cassette by storing, for example, an immediately preceding date and time at which each cassette Ca is transported.

[0336] A retrieve button (search button) A**636** receives an input operation for retrieving a cassette Ca within a range specified by the buttons A**631** to A**635**. In response to an input operation on any of the buttons A**631** to A**635**, the touchscreen controller **14** causes the retrieve button A**636** to be ready for an input operation (active). In response to an input operation on the retrieve button A**636**, the touchscreen controller **14** displays retrieval results in a range specified with the buttons A**631** to A**635** in the retrieval result display area A**643**.

[0337] The first display area A**64** includes a shelf inventory value read button A**641**, a loading list generation button A**642**, the retrieval result display area A**643**, an interrupt button A**644**, and a cassette move button A**645**.

[0338] The shelf inventory value read button A**641** receives an input operation for retrieving information about drugs stored in the main unit **2** from drugs managed by the storage management system, and displaying the information in the retrieval result display area A**643**. The loading list generation button A**642** receives an input operation for printing the retrieval result appearing in the retrieval result display area A**643**. The drug station **1** may be connected to a printer **1013** (refer to FIG. **28**).

[0339] The retrieval result display area A**643** displays a result of retrieval (loading list) obtained in the retrieval area A**63**. The touchscreen controller **14** displays, as the retrieval result, the same items of information as appearing in the retrieval result display area A**413** shown in FIG. **19**. The retrieval result display area A**643** includes a load target field for selecting whether each drug is to be loaded. In this example, in response to every input operation on the load target field, either the circle sign or the minus sign appears selectively. The circle sign indicates that the drug has been selected to be loaded. The minus sign indicates that the drug has been selected not to be loaded. The checkmark indicates the completion of loading into the cassette Ca.

[0340] The interrupt button A**644** receives an input operation for interrupting transportation of a cassette Ca containing a drug to be selected for loading. The cassette move button A**645** receives an input operation for starting to transport the cassette Ca.

[0341] The second display area A**65** displays information about a drug selected to be loaded. The second display area A**65** includes, for example, a drug information display area A**651**, a loading number input area A**652**, and a confirm button A**653**.

[0342] The drug information display area A**651** displays information about a drug selected to be loaded and a cassette Ca containing the drug. In this example, the drug information display area A**651** displays an image of the drug, the cassette number of the cassette Ca containing the drug transported to the drug receiver **32**, and the lot number and the expiry date of the drug. The drug information display area A**651** further displays the cassette number of any family cassette.

[0343] The loading number input area A**652** can receive an input of the quantity of the drug loaded into the cassette Ca transported to the drug receiver **32**. In response to an input operation in the numerical input area, the touchscreen controller **14** displays, for example, a numerical keypad.

[0344] In response to an input operation on the confirm button A**653** after the quantity of the drug is input in the loading number input area A**652**, the main unit controller **11** and the picking unit controller **12** return the cassette Ca transported to the drug receiver **32** to the main unit **2**. Also, the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug

to be loaded next from the main unit **2** to the drug receiver **32**. Without an input operation on the interrupt button A**644**, this operation is repeated until all the drugs selected to be loaded in the retrieval result display area A**643** are loaded into their corresponding cassettes Ca. Also, the control unit **10** can update the quantity of the drug contained in the cassette Ca based on the numerical value input into the loading number input area A**652**.

Log View Screen Image

[0345] FIG. **21** is a diagram of an example log view screen image **21001**. The log view screen image **21001** displays a log of processes (operations) performed by the drug station **1**.

Example Screen Image on Second Touchscreen

[0346] An example screen image to appear on the second touchscreen **31** will now be described. FIGS. **22** to **27** are diagrams of example screen images to appear on the second touchscreen **31**.

Example Screen Image before Determination about Quantity of Drug to Be Dispensed

[0347] In response to the drug station **1** being activated, the touchscreen controller **14** causes an initial screen image to appear on the second touchscreen **31**. The initial image may be, for example, a black display image. When any cassette Ca is transported to the drug receiver **32** for automated dispensing or selected dispensing of drugs, the touchscreen controller **14** displays, for example, a first confirmation screen image **22001** shown in FIG. **22**.

[0348] The first confirmation screen image **22001** displays information used by the user when removing a drug from the cassette Ca. The first confirmation screen image **22001** includes, for example, a first display area B**11**, a second display area B**12**, a refill button B**13**, a family cassette call button B**14**, and a supplementary information display area B**15**.

[0349] The first display area B**11** displays, for example, a prompt message for the user or a count result. In the first confirmation screen image **22001**, the touchscreen controller **14** displays, in the first display area B**11**, a message prompting the user to read information about a barcode (e.g., a GS**1** barcode) added to a drug removed from the cassette Ca with the barcode reader **34**.

[0350] The second display area B**12** displays information about the drug to be removed from the cassette Ca. The second display area B**12** displays, for example, the name of the drug to be dispensed (to be removed), the prescribed drug quantity (the quantity of the drug to be removed), and the image of the drug. For dispensing drug sheets, the touchscreen controller **14** displays, for example, the number of drug sheets, the number of drug pieces (separate drug pieces), and the total quantity of the drug as the prescribed drug quantity.

[0351] In the second display area B**12**, in particular, the prescribed quantity of the drug to be dispensed (target value for the quantity of the drug to be dispensed) appears larger than the other information. The control unit **10** transports the cassette Ca containing the drug to be dispensed to the drug receiver **32** based on the prescription data, and opens the shutter **322** to allow the user to access the storage position of the drug. The user is thus unlikely to remove any drug other than the drug to be dispensed. The user manually removes the drug from the cassette Ca. Thus, the user may mistakenly remove the drug in the quantity different from the prescribed drug quantity (incorrect quantity). Any uncertified user without a qualification of, for example, a pharmacist may perform a picking operation and may mistakenly remove a drug in an incorrect quantity. The prescribed quantity of the drug to be dispensed appearing large as described above can aid the user in performing a picking operation, thus allowing the user to easily remove the drug in the prescribed quantity.

[0352] Although the opening and closing control of the shutter **322** alone will be referred to in the present embodiment, the drug station **1** according to the third embodiment also opens and closes shutters **322**_a_, similarly to the shutter **322**.

[0353] The second display area B**12** further includes a family cassette display area B**121**, a terminate button B**122**, and a confirm button B**123**.

[0354] The family cassette display area B**121** displays the cassette number of any cassette Ca associated with a family cassette on the drug receiver **32**. In response to every input operation in

the family cassette display area B**121**, the touchscreen controller **14** switches the screen image between displaying and hiding the cassette number of the cassette Ca. At default, the cassette number of the cassette Ca may be hidden.

[0355] The family cassette display area B**121** appears for any cassette Ca associated with a family cassette. In other words, the family cassette display area B**121** does not appear when a cassette Ca called is not associated with any family cassette.

[0356] The terminate button B**122** receives an input operation for interrupting a drug picking operation. In response to an input operation on the terminate button B**122**, the touchscreen controller **14** displays, for example, a termination accept screen image **23001** shown in FIG. **23**. In response to an input operation for accepting a forced termination on the termination accept screen image **23001**, the main unit controller **11** and the picking unit controller **12** close the shutter **322** and return the cassette Ca placed on the drug receiver **32** to the main unit **2**. Also, the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug to be dispensed next from the main unit **2** to the drug receiver **32**.

[0357] The confirm button B**123** receives an input operation performed by the user confirming that the prescribed quantity of the drug has been removed from the cassette Ca.

[0358] The touchscreen controller **14** activates the terminate button B**122** when displaying the first confirmation screen image **22001**, a second confirmation screen image **22002**, a third confirmation screen image **23002**, or a second confirmation screen image **25001** (refer to FIG. **25**). The touchscreen controller **14** activates the confirm button B**123** when displaying a first determination screen image **24001** (refer to FIG. **24**). The touchscreen controller **14** activates a confirm button B**53** to cause a dispensing quantity input screen image **26001** to appear (refer to FIG. **26**).

[0359] The refill button B**13** receives an input operation for enabling a loading operation of a drug into a cassette Ca when removing the drug from the cassette Ca. The family cassette call button B**14** receives an input operation for transporting, to the second drug receiver **32***b*, a cassette Ca containing a drug to be dispensed or an associated cassette Ca to be a family cassette (also referred to as an interrupt tray).

[0360] The supplementary information display area B**15** displays any item of supplementary information associated with a drug to be dispensed. The supplementary information indicates one or more check items to be checked by the user in a picking operation. More specifically, the supplementary information display area B**15** displays a checklist for a picking operation.

[0361] The supplementary information includes, for example, information indicating whether any object is to be placed on the transportation tray Tr together with a drug, such as a description sheet describing the dosage of the drug. An example description screen image **24002** shown in FIG. **24** displays such supplementary information. The memory **15** stores such supplementary information in a manner associated with, for example, drug identification information.

[0362] The supplementary information display area B**15** has checkboxes for supplementary information. The user can perform an input operation on the checkbox when, for example, reviewing the check item indicated by the supplementary information. In response to an input operation on the checkbox, the touchscreen controller **14** can display a checkmark in the checkbox.

[0363] In response to every input operation in the supplementary information display area B**15**, the touchscreen controller **14** resize the supplementary information display area B**15**. At default, the supplementary information display area B**15** has a minimum size (e.g., a size to accommodate a single item of supplementary information viewable as shown in FIG. **22**).

[0364] In response to the control unit **10** determining that information read by the barcode reader **34** (e.g., a GS**1** barcode) indicates a drug to be dispensed while the first confirmation screen image **22001** is appearing, the touchscreen controller **14** switches the screen image to displaying the second confirmation screen image **22002**.

[0365] Similarly to the first confirmation screen image **22001**, the second confirmation screen image **22002** shown in FIG. **22** displays information to be used for drug dispensing. For the second

confirmation screen image **22002**, the touchscreen controller **14** displays, in the first display area B**11**, a message prompting the user to remove the drug in the prescribed quantity from the cassette Ca. In response to the appearing message, the user removes the drug in the quantity appearing in the second display area B**12** from the cassette Ca.

[0366] In response to the control unit **10** determining that information read by the barcode reader **34** does not indicate a drug to be dispensed while the first confirmation screen image **22001** is appearing, the touchscreen controller **14** switches the screen image to displaying the third confirmation screen image **23002**. The third confirmation screen image **23002** shown in FIG. **23** displays, in, for example, the first display area B**11**, information about a mismatch between information read by the barcode reader **34** and drug identification information about a drug to be dispensed.

[0367] In response to the cassette Ca being transported to the drug receiver **32** in the present embodiment, the touchscreen controller **14** displays the first confirmation screen image **22001** to prompt the user to read information about the barcode with the barcode reader **34**. However, the barcode information may not be read. Without the user reading the information, the touchscreen controller **14** displays the second confirmation screen image **22002** instead of the first confirmation screen image **22001** in response to the cassette Ca being transported to the drug receiver **32**. Without the user reading the information, the touchscreen controller **14** does not display the third confirmation screen image **23002**. As appropriate, the user may or may not be prompted to read the information.

Example Screen Image after Determination about Quantity of Drug to Be Dispensed When Determination Is Affirmative

[0368] As described in the first embodiment, the drug determiner **124** determines whether the prescribed quantity of drug has been removed from the cassette Ca based on an image of the drug captured by the image sensor **335** and the weight of the drug measured by the measuring unit **336**. In response to the drug determiner **124** determining that the prescribed quantity of the drug has been removed, the touchscreen controller **14** displays, for example, the first determination screen image **24001** shown in FIG. **24**.

[0369] The touchscreen controller **14** displays, in the first display area B**11**, the captured image of the drug and the count result based on the weight of the drug on the first determination screen image **24001**. More specifically, the first determination screen image **24001** can display, in the single screen image, the count result, together with the indexes for the drug to be dispensed, such as the drug name, the prescribed quantity of the drug to be dispensed, and the image of the drug appearing in the second display area B**12**. This allows the user to view the count result together with the indexes for the drug to be dispensed.

[0370] The first determination screen image **24001** displays, as the count result, the same quantity as the prescribed drug quantity (target value) appearing in the second display area B**12**. For dispensing drug sheets, as shown in FIG. **24**, the first determination screen image **24001** displays, for example, the number of drug sheets, the number of drug pieces (separate drug pieces), and the total quantity of the drug, as shown in the second display area B**12**.

[0371] The touchscreen controller **14** displays the first determination screen image **24001** indicating that the prescribed quantity of the drug has been removed from the cassette Ca. In this example, as shown in FIG. **24**, the touchscreen controller **14** displays the circle sign image as an image indicating the determination result (determination result image) in substantially the middle of the first determination screen image **24001**. Thus, the user can view the determination result indicating whether the prescribed quantity of the drug has been removed.

[0372] Also, the touchscreen controller **14** displays the determination result image in a relatively enlarged manner to improve visibility for the user. Also, the touchscreen controller **14** displays the determination result image to allow the underlying image to be still viewable. In this example, the touchscreen controller **14** displays, as the determination result image, a semi-transparent circle

image superimposed on the prescribed quantity of the drug to be dispensed, the image of the drug, and the other information in the second display area B**12**. This allows the user to view the determination result together with, for example, the count result, the drug name, the prescribed quantity of the drug to be dispensed, and the drug image.

[0373] Also, in response to an input operation (e.g., an upward swipe operation) in the supplementary information display area B**15**, the touchscreen controller **14** displays, for example, the description screen image **24002** shown in FIG. **24**. The description screen image **24002** includes the supplementary information display area B**15** maximized by the touchscreen controller **14** to show multiple items of supplementary information. The touchscreen controller **14** displays the supplementary information display area B**15** in an enlarged manner to cause the supplementary information display area B**15** to be superposed on, for example, the activated confirm button B**123** (to cause the confirm button B**123** to be invisible). This prompts the user to perform an input operation on the checkbox(es) for the supplementary information display area B**15**. This can also prevent the user from erroneously performing an input operation on the confirm button B**123** during the display of the enlarged supplementary information display area B**15** (specifically, while the user is viewing the supplementary information).

[0374] A tray removal screen image **24003** prompts the user to remove the transportation tray Tr from the picking unit **3**. As described in the third embodiment, the tray removal screen image **24003** appears when the transportation tray Tr is to be replaced manually for each patient, instead of being automatically replaced for each patient as described in the first embodiment. This allows the user to place the transportation tray Tr to receive drugs to be dispensed for the next patient based on prescription data onto the picking unit **3**. Thus, the user can dispense drugs based on prescription data for each patient onto a different transportation tray Tr.

[0375] Also, the first determination screen image **24001** includes a tray close button B**21**. The tray close button B**21** receives an input operation for closing the open shutter **322**.

[0376] After the user completes an input operation on the checkbox(es) for the supplementary information display area B**15**, and then performs an input operation in the supplementary information display area B**15** (e.g., a downward swipe operation), the touchscreen controller **14** displays the supplementary information display area B**15** in a reduced manner. More specifically, the touchscreen controller **14** displays the first determination screen image **24001**.

[0377] In this state, in response to an input operation on the confirm button B**123**, the main unit controller **11** and the picking unit controller **12** close the shutter **322** and return the cassette Ca placed on the drug receiver **32** to the main unit **2**. In response to an input operation on the confirm button B**123** and an input operation on the tray close button B**21** or a tray close button **39** (refer to FIG. **33**), the main unit controller **11** and the picking unit controller **12** may close the shutter **322**. Also, in response to the above input operation, the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug to be dispensed next from the main unit **2** to the drug receiver **32**. In response to the cassette Ca being placed on the drug receiver **32**, the touchscreen controller **14** displays the first confirmation screen image **22001** or the second confirmation screen image **22002** including information about the drug to be dispensed next. When the last drug indicated by the prescription data is dispensed, the touchscreen controller **14** displays, for example, either the initial screen image or the tray removal screen image **24003** shown in FIG. **24**.

[0378] In the present embodiment, the touchscreen controller **14** displays the confirm button B**123** in each of the screen images shown in FIGS. **22** to **24**. In some embodiments, the touchscreen controller **14** may not display the confirm button B**123**. In this case, in response to an input operation on the tray close button B**21** on the first determination screen image **24001** or on the tray close button **39**, the main unit controller **11** and the picking unit controller **12** close the shutter **322**. Subsequently, the main unit controller **11** and the picking unit controller **12** return the cassette Ca placed on the drug receiver **32** to the main unit **2**. Also, in response to the above input operation,

the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug to be dispensed next from the main unit **2** to the drug receiver **32**. When neither the confirm button B**123** nor the tray close button B**21** appears on the first determination screen image **24001**, the above operation may be performed in response to an input operation on the tray close button **39**.

[0379] The touchscreen controller **14** displays, on the description screen image **24002** in FIG. **24**, the supplementary information display area B**15** in an enlarged manner to cause the supplementary information display area B**15** to be superposed on the tray close button B**21** (to cause the tray close button B**21** to be invisible). This can also prevent the user from erroneously performing an input operation on the tray close button B**21** during the display of the enlarged supplementary information display area B**15** (specifically, while the user is viewing the supplementary information).

When Determination Is Negative

[0380] In response to the drug determiner **124** determining that the drug in the quantity different from the prescribed drug quantity has been removed from the cassette Ca, the touchscreen controller **14** displays, for example, the second determination screen image **25001** shown in FIG. **25**. Similarly to the first determination screen image **24001**, the second determination screen image **25001** can also display, in a single image, the count result together with the indexes for the drug to be dispensed. The second determination screen image **25001** displays, as the count result, the quantity of drug different from the prescribed drug quantity appearing in the second display area B**12**.

[0381] The touchscreen controller **14** displays the second determination screen image **25001** indicating that the drug in the quantity different from the prescribed drug quantity has been removed from the cassette Ca. In this example, as shown in FIG. **25**, the touchscreen controller **14** displays the cross sign image in substantially the middle of the second determination screen image **25001** as the determination result image. Also, the touchscreen controller **14** displays the determination result image in a relatively enlarged manner to improve visibility, similarly to the first determination screen image **24001**. Also, the touchscreen controller **14** displays the determination result image (e.g., a transparent cross sign image) to allow the underlying image to be still viewable.

[0382] The drug determiner **124** may determine that the drug in the quantity different from the prescribed drug quantity has been removed from the cassette Ca in any of the cases below. (1) The quantity of the drug removed from the cassette Ca actually differs from the prescribed quantity of the drug to be dispensed; more specifically, the user has removed a larger quantity or smaller quantity of drug than the prescribed drug quantity. (2) The quantity of the drug removed from the cassette Ca is equal to the prescribed drug quantity, but the measurement by the image sensor **335** or by the measuring unit **336** is erroneous.

[0383] Also, the second determination screen image **25001** displays a correction button B**124**. When the first determination screen image **24001** displays the confirm button B**123**, the second determination screen image **25001** displays the correction button B**124** replacing the confirm button B**123**. The correction button B**124** receives an input operation for correcting the count result. In response to an input operation on the correction button B**124**, the touchscreen controller **14** displays, for example, a quantity correction screen image **25002** shown in FIG. **25**.

[0384] In response to the second determination screen image **25001** appearing, the user removes the drug from the transportation tray Tr, and determines the quantity of the drug on the transportation tray Tr. In the case (**1**) above, the user places the prescribed quantity of drug to be dispensed onto the transportation tray Tr again, and then performs an input operation on the correction button B**124**. In the case (**2**) above, the user returns, onto the transportation tray Tr, the drug removed from the transportation tray Tr without changing the quantity of the drug, and then performs an input operation on the correction button B**124**. More specifically, the correction button B**124** allows the user to correct the count result in any of the cases (**1**) and (**2**).

[0385] The quantity correction screen image **25002** is used to correct the count result. The quantity correction screen image **25002** includes the first display area B**11**, a quantity input area B**31**, a cancel button B**32**, and a correction button B**33**. The touchscreen controller **14** displays a message in the first display area B**11** prompting the user to correct the count result. The quantity input area B**31** can receive an input of a numerical value. In response to an input operation in the quantity input area B**31**, the touchscreen controller **14** displays, for example, a numerical keypad.

[0386] The cancel button B**32** receives an input operation for redisplaying the second determination screen image **25001**. The correction button B**33** is used to enter the correction, and receives an input operation for displaying, for example, a transmission screen image **25003** shown in FIG. **25**. When the drug determiner **124** finds a mismatch between the correction and the prescribed quantity of the drug to be dispensed, the touchscreen controller **14** may continue to display the quantity correction screen image **25002** without displaying the transmission screen image **25003** in response to an input operation on the correction button B**33**.

[0387] The transmission screen image **25003** displays, in a selectable manner, various comments to be transmitted to a prescription manager **1011** (refer to FIG. **28**) connected to the drug station **1**. The transmission screen image **25003** includes the first display area B**11**, a comment area B**41**, a close button B**42**, and a transmission button B**43**.

[0388] The touchscreen controller **14** displays, in the first display area B**11**, a message prompting the user to select and transmit a comment. The comment area B**41** displays various comments in a selectable manner. The comments are prepared in advance to provide information noticed by the user during a picking operation to the prescription manager **1011**.

[0389] The comments are stored in, for example, the memory **15**.

[0390] The close button B**42** receives an input operation for closing the transmission screen image **25003**. In this case, no comment is transmitted to the prescription manager **1011**. The transmission button B**43** receives an input operation for transmitting a comment to the prescription manager **1011**. More specifically, in response to an input operation on the transmission button B**43**, the control unit **10** transmits a comment selected by the user to the prescription manager **1011**.

[0391] In response to an input operation on the close button B**42** or the transmission button B**43**, the touchscreen controller **14** displays the first confirmation screen image **22001** displaying information about a drug to be dispensed next when the cassette Ca containing the drug is placed on the drug receiver **32**. The touchscreen controller **14** may display the second confirmation screen image **22002** displaying information about the drug instead. When the last drug indicated by the prescription data is dispensed, the touchscreen controller **14** either returns to the initial screen image or displays, for example, the tray removal screen image **24003** shown in FIG. **24**.

[0392] The second determination screen image **25001** may not display the correction button B**124**. In this case, the terminate button B**122** has the same function as the correction button B**124**. More specifically, in response to an input operation on the terminate button B**122** on the second determination screen image **25001**, the touchscreen controller **14** displays the quantity correction screen image **25002**, instead of displaying the termination accept screen image **23001** shown in FIG. **23**.

Correction by Displaying Dispensing Quantity Input Screen Image **26001**

[0393] In response to an input operation on the family cassette call button B**14** on the second determination screen image **25001**, the touchscreen controller **14** displays, for example, the dispensing quantity input screen image **26001** shown in FIG. **26**.

[0394] The dispensing quantity input screen image **26001** can receive an input of the quantity of a drug to be dispensed. The dispensing quantity input screen image **26001** includes, for example, a dispensing quantity input area B**51**, a cancel button B**52**, and the confirm button B**53**.

[0395] The dispensing quantity input area B**51** can receive an input of the total quantity of the drug (dispensing quantity) removed from the cassette Ca. In response to an input operation in the dispensing quantity input area B**51**, the touchscreen controller **14** displays, for example, a

numerical keypad. The cancel button B**52** receives an input operation for redisplaying the second determination screen image **25001**. The confirm button B**53** receives an input operation performed by the user confirming that the prescribed quantity of the drug has been removed from the cassette Ca.

[0396] In response to an input operation on the confirm button B**53**, the main unit controller **11** and the picking unit controller **12** return the cassette Ca placed on the drug receiver **32** to the main unit **2**. Also, the main unit controller **11** and the picking unit controller **12** transport a cassette Ca containing a drug to be dispensed next from the main unit **2** to the drug receiver **32**. In response to the cassette Ca being placed on the drug receiver **32**, the touchscreen controller **14** displays the first confirmation screen image **22001** or the second confirmation screen image **22002** including information about the drug to be dispensed next.

[0397] For any family cassette available, the user can remove the prescribed quantity of the drug by removing the drug from another cassette Ca different from the cassette Ca containing the drug to be dispensed. The user can thus correct the count result.

[0398] The touchscreen controller **14** may display a tray close button having the same function as the tray close button B**21** in the dispensing quantity input screen image **26001**. The touchscreen controller **14** may not display the confirm button B**53** in the dispensing quantity input screen image **26001**. In this case, the above process is performed in response to the tray close button appearing in the dispensing quantity input screen image **26001** or an input operation on the tray close button **39**. When the dispensing quantity input screen image **26001** displays neither the confirm button B**53** nor the tray close button, the above process is performed in response to an input operation on the tray close button **39**.

Loading Drug during Picking Operation

[0399] The touchscreen controller **14** activates the refill button B**13** when displaying the second confirmation screen image **22002** shown in FIG. **22**. In response to an input operation on the refill button B**13**, the touchscreen controller **14** displays, for example, a login screen image **27001** shown in FIG. **27**. In response to successful user authentication with an operator ID and a password input on the login screen image **27001**, the touchscreen controller **14** displays a loading operation screen image **27002**.

[0400] The loading operation screen image **27002** is used to perform a loading operation of a drug into a cassette Ca during a picking operation on the cassette Ca placed on the drug receiver **32**. The loading operation screen image **27002** includes the first display area B**11**, a drug name display area B**61**, a loading quantity display area B**62**, a cancel button B**63**, and a load button B**64**. The touchscreen controller **14** displays a message prompting the user to load the drug into the cassette Ca in the first display area B**11**.

[0401] The drug name display area B**61** displays the name of the drug contained in the cassette Ca placed on the drug receiver **32**. The loading quantity display area B**62** displays the drug loading quantity for the cassette Ca, the lot number, and the expiry date. In response to an input operation in the loading quantity display area B**62**, the touchscreen controller **14** displays, for example, a keypad. The touchscreen controller **14** may display the lot number and the expiry date read using the barcode reader **34** from the barcode added to the drug.

[0402] The cancel button B**63** receives an input operation for redisplaying the second confirmation screen image **22002**. The load button B**64** receives an input operation for entering the information appearing in the loading quantity display area B**62**. In response to an input operation in the loading quantity display area B**62**, the control unit **10** stores the information into the memory **15** in a manner associated with the cassette identification information about the cassette Ca placed on the drug receiver **32**. Also, the touchscreen controller **14** redisplays the second confirmation screen image **22002**.

[0403] When finding a mismatch between the information (e.g., the GS**1** barcode) read by the barcode reader **34** and the drug identification information about the drug contained in the cassette

Ca placed on the drug receiver **32**, the touchscreen controller **14** displays a screen image informing the user of the mismatch. One such example is a notification screen image **27003** shown in FIG. **27**.

Example Screen Images on Tablet Terminal

[0404] Example screen images to appear on a tablet terminal **1012** will be described below. FIG. **28** is a diagram of an example drug preparation system **1000**. FIGS. **29** and **30** are diagrams of example screen images appearing on the tablet terminal **1012**. The drug preparation system **1000** will first be described to facilitate understanding of such example screen images appearing on the tablet terminal **1012**. FIG. **28** is a diagram of an example drug preparation system **1000**.

Drug Preparation System

[0405] As shown in FIG. **28**, the drug preparation system **1000** mainly includes the drug station **1** (or drug station **1**A) including the main unit **2** and the picking units **3**, the prescription manager **1011**, the tablet terminal **1012**, and the printer **1013**.

[0406] The prescription manager **1011** serves as a host system for various devices used for drug preparation (including the drug station **1**) at, for example, a pharmacy at which the drug station **1** is installed. The prescription manager **1011** transmits, for example, sets of prescription data for individual patients to the various devices. The prescription manager **1011** also transmits, for each set of prescription data, information identifying drugs to be dispensed at the various devices.

[0407] Each picking unit **3** includes a PC **3**. One PC **301** operates as a server, whereas the other PCs **301** operate as clients.

[0408] The PC **301** operating as the server centrally controls the entire drug station **1**. The PC **301** operating as the server implements, for example, all the functions of the control unit **10**. Also, the PC **301** selects a picking unit **3** to be assigned to dispensing drugs based on received prescription data. The PC **301** is connected to the prescription manager **1011**, the tablet terminal **1012**, and the printer **1013**.

[0409] Each PC **301** operating as a client controls at least the picking unit **3** including the PC **301**. Each PC **301** operating as a client implements, for example, the functions of the picking unit controller **12** and the touchscreen controller **14** in the control unit **10**.

[0410] The tablet terminal **1012** can display various items of information about the drug station **1** and can receive various input operations. The tablet terminal **1012** includes a touchscreen **1012**A, a controller **1012**B, and a memory **1012**C. The touchscreen **1012**A can display those various items of information and can receive those various input operations. The controller **1012**B controls the components of the tablet terminal **1012**. The memory **1012**C stores information used for the processing performed by the controller **1012**B.

[0411] In response to an instruction from each PC **301** or from the tablet terminal **1012**, the printer **1013** outputs printed matter such as journal data printed on a sheet.

[0412] The PC **301** operating as the server is connected to the tablet terminal **1012** and the printer **1013** when the drug station **1** is operating normally. The PC **301** is disconnected from the tablet terminal **1012** and the printer **1013** in response to any abnormality (failure) in the drug station **1**. In other words, in response to any abnormality in the drug station **1**, the tablet terminal **1012** and the printer **1013** are disconnected and can operate independently of the drug station **1**.

[0413] When connected to the tablet terminal **1012**, the PC **301** operating as the server transmits various items of information stored in the memory **15** to the tablet terminal **1012** in a timely manner (e.g., every thirty minutes or every one hour). The items of information include information about a drug associated with cassette identification information about each cassette Ca and storage position information about the drug.

[0414] The tablet terminal **1012** to receive such various items of information may be replaced by any other device that is connected to the PC **301** during normal operation of the drug station **1** and is disconnected from the PC **301** in response to any abnormality in the drug station **1**. More specifically, the items of information may at least be managed by another device that can be

disconnected from the PC **301** in response to any abnormality in the drug station **1**.

[0415] The controller **1012**B determines that the drug station **1** has an abnormality when, for example, receiving no response from the PC **301** operating as the server or failing to receive the items of information. In this case, the controller **1012**B switches the screen image from a screen image to appear during normal operation of the drug station **1** (e.g., a status image) to a screen image to appear during an abnormal operation (e.g., an emergency dispensing image).

[0416] The controller **1012**B may determine that the drug station **1** has an abnormality in response to any report from the PC **301** about a faulty component in the drug station **1**. Also, the user of the drug station **1** may switch the screen image from the screen image to appear during normal operation to the screen image to appear during abnormal operation by operating the touchscreen **1012**A in response to determining that the drug station **1** has an abnormality.

Screen Image on Tablet Terminal: Normal Operation

[0417] The controller **1012**B displays, for example, a status image **29001** shown in FIG. **29** on the touchscreen **1012**A as the screen image to appear during normal operation of the drug station **1**. The status image **29001** displays information about the status of the drug station **1**, such as the operating status of each component of the drug station **1** and the dispensing status of each drug at the drug station **1**. The controller **1012**B updates the status image **29001** in response to every update of the information about the drug station **1** that is transmitted as appropriate.

Screen Image on Tablet Terminal: Abnormal Operation

[0418] The controller **1012**B either automatically or manually displays, for example, an emergency dispensing image **30001** shown in FIG. **30** in response to any abnormality in the drug station **1**. The emergency dispensing image **30001** allows the user to manually generate a list of drugs to be dispensed based on prescription data in response to any abnormality in the drug station **1**.

[0419] The controller **1012**B disconnects the PC **301** operating as the server in response to any abnormality in the drug station **1**. After such disconnection, the controller **1012**B reads information associated with the cassette identification information (cassette-associated information) stored in the memory **1012**C. When the cassette-associated information is managed by the other device, the controller **1012**B obtains the cassette-associated information from the other device. The controller **1012**B generates the emergency dispensing image **30001** based on the obtained cassette-associated information.

[0420] The emergency dispensing image **30001** includes a drug list display area C**11** and a dispensing drug display area C**12**.

[0421] The drug list display area C**11** receives an input operation for retrieving information from the obtained cassette-associated information and displays the retrieval result. The drug list display area C**11** includes a first retrieval area C**111**, a second retrieval area C**112**, a retrieval result display area C**113**, and a dispensing list add button C**114**.

[0422] The first retrieval area C**111** and the second retrieval area C**112** receive an input operation for retrieving drugs to appear in the retrieval result display area C**113**. The first retrieval area C**111** and the second retrieval area C**112** have the same functions as the first retrieval area A**411** and the second retrieval area A**412** included in the selected dispensing screen image **19001** shown in FIG. **19**.

[0423] The retrieval result display area C**113** displays a retrieval result for the obtained cassette-associated information. The retrieval result display area C**113** has the same display items as in the retrieval result display area A**413** included in the selected dispensing screen image **19001** shown in FIG. **19**.

[0424] The dispensing list add button C**114** receives an input operation for adding, to a dispensing list area C**121**, information about one or more drugs selected from the drugs appearing in the retrieval result display area C**113**.

[0425] The dispensing drug display area C**12** displays drugs to be dispensed based on prescription data. In this example, the dispensing drug area C**121** includes the dispensing list area C**121**, a

dispensing quantity input area C**122**, a settings button C**123**, a clear button C**124**, and a journal data output button C**125**.

[0426] The dispensing list area C**121** displays information about one or more drugs selected by the user from the drugs appearing in the retrieval result display area C**113**. In this example, the dispensing list area C**121** displays the names of the selected drugs as well as the cassette number and the sub-number of the cassette Ca containing each of the drugs. Also, the quantity field in the dispensing list area C**121** reflects the numerical value input in the dispensing quantity input area C**122**. The dispensing list area C**121** includes a cross sign button to be a delete button for receiving an input operation for deleting information about each selected drug.

[0427] In response to an input operation on the dispensing list add button C**114** with, for example, the information about one or more drugs being selected in the retrieval result display area C**113**, the controller **1012**B displays the information about the drugs in the dispensing list area C**121**. The controller **1012**B may display the information in the dispensing list area C**121** by receiving a drag operation in the dispensing list area C**121** for the information about one or more drugs selected in the retrieval result display area C**113**.

[0428] The dispensing quantity input area C**122** can receive an input of the quantity of the drug to be dispensed from the cassette Ca. In response to an input operation in the dispensing quantity input area C**122**, the controller **1012**B displays, for example, a numerical keypad. With one of the drugs appearing in the dispensing list area C**121** being selected, the dispensing quantity input area C**122** can receive an input of a numerical number.

[0429] The settings button C**123** receives an input operation for determining the quantity of the drug to be dispensed selected in the dispensing list area C**121** to be the quantity input in the dispensing quantity input area C**122** and reflecting the quantity in the quantity field in the dispensing list area C**121**.

[0430] The clear button C**124** receives an input operation for deleting all the information appearing in the dispensing list area C**121**. The journal data output button C**125** receives an input operation for causing the printer **1013** to output, as journal data, the information appearing in the dispensing list area C**121**.

[0431] As described above, the PC **301** as the server is disconnected from the tablet terminal **1012** in response to any abnormality in the drug station **1**. In this case, the controller **1012**B cannot receive various items of information from the PC **301**. However, the controller **1012**B can read various items of information managed either by the tablet terminal **1012** disconnected from the drug station **1** or by the above other device. The various items of information are obtained as appropriate by the tablet terminal **1012** or by the other device during normal operation of the drug station **1** (specifically, while the drug station **1** is connected to the tablet terminal **1012** or the other device). Thus, the controller **1012**B can display, in the retrieval result display area C**113**, information about one or more drugs managed by the drug station **1** either at the time when or immediately before the abnormality occurs.

[0432] The user selects information included in the prescription data from sets of information about drugs appearing in the retrieval result display area C**113** to display the list of drugs to be dispensed based on the prescription data in the dispensing list area C**121**. Thus, at the drug station **1** having an abnormality, the user can manually remove drugs indicated by prescription data from the main unit **2** by viewing the touchscreen **1012**A.

[0433] Also, the user can output, from the printer **1013**, the information (the dispensing list) appearing in the dispensing list area C**121**. The user can thus remove drugs indicated by prescription data from the main unit **2** by viewing the journal data, without viewing the touchscreen **1012**A. In this case, the user who has the tablet terminal **1012** and the user who has the journal data (in other words, the multiple users) can remove the drugs from the main unit **2**.

[0434] The drug preparation system **1000** may include multiple tablet terminals **1012**. In this case, in response to any abnormality in the drug station **1**, multiple users who have the tablet terminals

1012 can work separately to remove the drugs indicated by prescription data from the main unit **2**.

Third Embodiment

[0435] A drug station **1**A according to the present embodiment will be described mainly with reference to FIGS. **31** to **46**. The drug station **1**A will be described focusing on its components different from the corresponding components of the drug station **1** according to the first embodiment. In the present embodiment described below, drugs to be dispensed are drug sheets. The components of the drug station **1**A are controlled by the control unit **10** shown in FIG. **1**.

[0436] The drug station **1**A includes a main unit **2**A, a picking unit **3**A, and the inspection unit **4**. FIGS. **31** and **32** are perspective views of an example main unit **2**A. FIG. **31** shows the main unit **2**A as viewed from the front surface. FIG. **32** shows the main unit **2**A as viewed from the back surface. FIG. **33** is a perspective view of an example picking unit **3**A. FIG. **34** is a diagram of an example drug receptacle **37** and an example tray support **38** included in the picking unit **3**A. To simplify the drawing, FIG. **34** shows the picking unit **3**A without the upper surface and the side walls, the drug receptacle **37** without the side walls, and the tray support **38** without the side walls and the bottom. In FIG. **35**, the portion **35001** shows removal of a drug sheet from the drug receptacle **37** in a cross section, and the portion **35002** shows removal of a drug sheet from a cassette Ca**4** (refer to FIGS. **36** to **38**) in a cross section.

Appearance of Main Unit

[0437] As shown in FIGS. **31** and **32**, the main unit **2**A includes multiple doors **25** on both the front surface and the back surface. The user can open the doors **25** to directly access the cassette shelf **21**. FIG. **32** shows the main unit **2**A with selected doors **25** open on the back surface. The doors **25** may be transparent or semi-transparent to allow viewing the inside of the cassette shelf **21** from outside the main unit **2**A.

[0438] FIG. **31** shows the main unit **2**A having the single picking unit **3**A adjacent to its front surface. In some embodiments, the main unit **2**A may have multiple picking units **3**A adjacent to its front surface.

[0439] Also, the main unit **2**A differs from the main unit **2** in including a cassette gripper **226** that replaces the cassette gripper **221** and a cassette holder **230** that replaces the cassette holder **23**. The cassette gripper **226** and the cassette holder **230** will be described later.

Appearance of Picking Unit

[0440] As shown in FIG. **1**, the tray transporter **6** in the drug station **1** transports a transportation tray Tr stored in the tray storage **7** into the picking unit **3**. The tray transporter **6** also transports the transportation tray Tr receiving one or more drug sheets dispensed by the picking unit **3** toward the inspection unit **4**. More specifically, the tray transporter **6** automatically transports a transportation tray Tr to and from the picking unit **3**.

[0441] The drug station **1**A in the present embodiment does not include the tray transporter **6**. The user places a transportation tray Tr onto the picking unit **3**A and delivers a transportation tray Tr removed from the picking unit **3**A to the inspection unit **4**. To enable such user operations, as shown in FIGS. **31** and **33**, the picking unit **3**A includes the drug receptacle **37** and the tray support **38** on an upper surface **3***up* in which the receivers **32** (the first drug receiver **32***a* and the second drug receiver **32***b*) are located.

[0442] The drug receptacle **37** receives any separate drug pieces. In the present embodiment, the image sensor **335** is located adjacent to the drug receptacle **37** for capturing an image of separate drug pieces placed on the drug receptacle **37**. As shown in FIG. **34**, the drug receptacle **37** has two side walls on which light sources **371** are placed. In response to, for example, an input operation from a user, the picking unit controller **12** emits light from the light sources **371** and captures an image of any separate drug pieces placed on the drug receptacle **37**. The picking unit controller **12** recognizes the shape of a drug in the captured image, and compares the shape with each of various drug shapes stored in the memory **15** to determine the quantity of the drug. The memory **15** stores such various drug shapes in a manner associated with information indicating the quantity of the

drug.

[0443] Also, as shown in the portion **35001** of FIG. **35**, a side wall **37***wl* of the drug receptacle **37** adjacent to the standing position of the user slopes from its portion adjacent to the main unit **2** toward the user (in-Y-direction). When the drug receptacle **37** is viewed from above, the side wall **37***wl* slopes to cause a port **37***op* of the drug receptacle **37** to be larger than a bottom **37***bt* of the drug receptacle **37**. This structure allows one or more drug sheets imaged by the image sensor **335** to slide along the sloping side wall **37***wl* and be taken out when being removed from the drug receptacle **37** as shown in the portion **35001** (in the arrow direction in the figure).

[0444] The tray support **38** supports a transportation tray Tr. As shown in FIG. **34**, the tray support **38** includes the measuring unit **336** and a sensor **381**.

[0445] The measuring unit **336** measures the weight of the transportation tray Tr on the tray support **38** and the weight of any drug sheet on the transportation tray Tr. The memory **15** prestores the weight of the transportation tray Tr and the weight of each drug sheet containing a different type of drug. Thus, the drug determiner **124** can determine the quantity of a drug on the transportation tray Tr based on the measurement result obtained by the measuring unit **336**, the imaging result obtained by the image sensor **335**, or both the measurement result and the imaging result. The measuring unit **336** is located below the bottom of the tray support **38**.

[0446] In some embodiments, the memory **15** may not store the weight of a transportation tray Tr. The measuring unit **336** may determine the weight of any drug sheet by subtracting the tare weight. More specifically, after the transportation tray Tr is placed on the tray support **38**, the measuring unit **336** subtracts the tare weight. The user may then place a drug sheet on the transportation tray Tr. The measuring unit **336** can then measure the net weight of the drug sheet.

[0447] The sensor **381** detects the transportation tray Tr on the tray support **38**. In the present embodiment, the sensor **381** is a light transmissive sensor including two elements, or a light source for emitting light and a light detector for detecting the emitted light. The light transmissive sensor can precisely detect the presence of the transportation tray Tr. In the present embodiment, the sensor **381** includes the two elements located on the two side walls of the tray support **38**. The sensor **381** may be located on the bottom of the tray support **38**. However, the sensor **381** on the bottom emits light upward, which may annoy the user. The sensor **381** on the bottom may also collect dust. Further, the sensor **381** on the bottom is to be a reflective sensor, which may detect the transportation tray Tr with lower precision. The sensor **381** on the side walls is less likely to emit light that may annoy the user, collect dust, or reduce the precision in detecting the transportation tray Tr.

[0448] The user removes a drug in the quantity to be dispensed (one or more drug sheets and/or one or more separate drug pieces) from the cassette Ca placed on the drug receiver **32** based on information appearing on the second touchscreen **31**. For dispensing any separate drug pieces, the user places the drug pieces onto the drug receptacle **37**. The picking unit controller **12** controls the image sensor **335** to capture an image of the drug pieces placed on the drug receptacle **37**. Subsequently, the user removes the drug pieces from the drug receptacle **37** and places them onto the transportation tray Tr on the tray support **38**. For dispensing any drug sheets, the user ties the drug pieces removed from the drug receptacle **37** and the drug sheets removed from the cassette Ca into a predetermined shape with, for example, a rubber band, and places the drug sheets and the drug pieces onto the transportation tray Tr on the tray support **38**. For dispensing a drug sheets alone, the user places the drug sheet onto the transportation tray Tr on the tray support **38**. For dispensing multiple drug sheets, the user ties the drug sheets with, for example, a rubber band, into a predetermined shape for efficient handling in subsequent processes (e.g., drug inspection or drug administration). The user then places the tied drug sheets onto the transportation tray Tr on the tray support **38**. The picking unit controller **12** controls the measuring unit **336** to measure the weight of drug sheets and/or any separate drug pieces on the transportation tray Tr. The picking unit controller **12** (the drug determiner **124**) determines, based on the measurement result obtained by

the measuring unit **336** and/or the imaging result obtained by the image sensor **335**, the quantity of the drug placed, and determines whether the drug quantity matches the predetermined quantity indicated by prescription data. The touchscreen controller **14** displays the determination result on the second touchscreen **31**.

[0449] Also, as shown in FIG. **33**, the drug receiver **32** includes the shutter **322** as described in the first embodiment. The shutter **322** is open and closed in Y-direction. The drug receiver **32** additionally includes the shutters **322***a*. The shutters **322***a* are open and closed in a direction (X-direction) substantially perpendicular to the operating direction of the shutter **322**, as controlled by the shutter controller **122**. The shutters **322***a* can thus be open and closed in correspondence with the size of each cassette Ca with a varying width (e.g., a large cassette Ca**1**, a medium-sized cassette Ca**2**, a small cassette Ca**3**, or a cassette Ca**4** with a container Ca**41** or Ca**42**). The shutter **322** is open in Y-direction, and the shutters **322***a* are closed in X-direction in accordance with the width of the cassette Ca. This reduces the likelihood that drug sheets or separate drug pieces drop from the cassette Ca. The shutter **322** and the shutters **322***a* may be open and closed at the same time or in the order of one after the other.

[0450] Also, the picking unit **3**A includes the tray close buttons **39**, which are mechanical buttons corresponding to each shutter **322** in the first drug receiver **32***a* and the second drug receiver **32***b*. When the shutter **322** is open and the tray close button **39** corresponding to the shutter **322** is pressed, the shutter controller **122** controls the shutter **322** to be closed.

[0451] Also, as shown in FIG. **33**, the picking unit **3**A has the upper surface **3***up* having the drug receivers **32** and the drug receptacle **37**. The upper surface **3***up* slopes with respect to a horizontal plane. The upper surface **3***up* slopes from its portion adjacent to the main unit **2** to be lower toward a portion adjacent to the standing position of the user (in-Y-direction).

[0452] As shown in the portion **35002** of FIG. **35**, the picking cassette transporter **35** moves a cassette gripper to cause the sloping opening of the slot **321** to be substantially parallel to the upper surface of the cassette Ca**4** gripped by the cassette gripper. The cassette gripper may be either the first cassette gripper **351** or the second cassette gripper **355**. For example, the picking cassette transporter **35** may include a device for raising or lowering the first cassette gripper **351** (or the second cassette gripper **355**) at the drug receiver **32**. The cassette Ca**4** is tilted at the drug receiver **32** in correspondence with the upper surface **3***up* that slopes as described above to allow the user to more easily view the inside of the cassette Ca**4**.

[0453] As shown in FIG. **33** and the portion **35002** of FIG. **35**, each drug receiver **32** includes a periphery **32***ed*. The periphery **32***ed* slopes from its portion adjacent to the bottom of the drug receiver **32** (adjacent to the picking cassette transporter **35**) toward the slot **321** (in +Z-direction) outwardly in the drug receiver **32**. As shown in the portion **35001** of FIG. **35**, drug sheets can slide along the sloping periphery **32***ed* and be taken out when being removed from the cassette Ca**4** placed on the drug receiver **32** (in the arrow direction in the figure).

[0454] The single first touchscreen **5** and the single second touchscreen **31** are provided for the picking unit **3**A. Similarly to each picking unit **3** in the first embodiment, the picking unit **3**A includes the picking cassette transporter **35** for each of the first drug receiver **32***a* and the second drug receiver **32***b* as shown in FIG. **9**.

Cassette

[0455] Example cassettes Ca that can be used at the drug station herein, or specifically cassettes Ca**4**, will now be described with reference to FIGS. **36** to **38**. Each cassette Ca**4** has substantially the same profile as the large cassette Ca**1** shown in FIGS. **3**A to **3**D.

[0456] FIG. **36** is a view of a cassette Ca**4** showing its example structure. In FIG. **36**, the portion **36001** shows an example cassette Ca**4** including a container Ca**41** in a perspective view, and the portion **36002** shows the cassette Ca**4** including the container Ca**41** in a plan view. In FIG. **36**, the portion **36003** shows the cassette Ca**4** including the container Ca**41** in a cross section taken along line A-A′. FIG. **37** is a perspective view of an example cassette Ca**4** including a container Ca**42**.

The portion **37002** of FIG. **37** shows the cassette Ca**4** including the container Ca**42** in a plan view. The portion **37003** of FIG. **37** shows the cassette Ca**4** including the container Ca**42** in a cross section taken along line B-B′. The portion **37004** of FIG. **37** shows the cassette Ca**4** with the container Ca**42** that has slid in a perspective view. The portion **37004** of FIG. **37** also shows the container Ca**42** in the cassette Ca**4** showing its example structure. Also, FIG. **38** is a perspective view of an example cassette Ca**4** including a container Ca**41** and a container Ca**42**.

[0457] As shown in FIGS. **36** and **37**, each cassette Ca**4** differs from the large cassette Ca**1** in including protrusions Ca**40**, the container Ca**41**, and/or the container Ca**42**. The protrusions Ca**40** protrude on the longer side surfaces of each cassette Ca**4**. A single protrusion Ca**40** may be on each of the two longer sides of each cassette Ca**4**, or two or more protrusions Ca**40** may be on each of the two loner sides of each cassette Ca**4**.

[0458] As shown in FIG. **36**, the cassette Ca**4** includes multiple protrusions Ca**40** on each of the two side surfaces. Adjacent protrusions Ca**40** are separated by slits Ca**45**. The slits Ca**45** receive one or more partitions Ca**44** inside the cassette Ca**4** as shown in FIGS. **37** and **38**. The cassette Ca**4** may have multiple internal compartments for storing drug sheets, as described with reference to FIGS. **3**A to **3**D. Each partition Ca**11** in FIGS. **3**A to **3**D may have the same shape as the partition Ca**44**.

[0459] The container Ca**41** stores any separate drug pieces. As shown in FIG. **36**, the container Ca**41** includes peripheral walls Ca**411**, at least one compartment Ca**412**, and a slope Ca**413**. The container Ca**41** may be secured to one shorter side of the cassette Ca**4** or may be removable. When the user removes separate drug pieces, the container Ca**41** may have one of its longer sides in contact with one lateral end of the cassette Ca**4**.

[0460] The peripheral walls Ca**411** are plates along the shorter sides of the container Ca**41**. A removable container Ca**41** has its peripheral walls Ca**411** on protrusions Ca**40** on a cassette Ca**4**. This supports the container Ca**41** on the cassette Ca**4**.

[0461] The compartment Ca**412** can store any separate drug pieces. The compartment Ca**412** may be sized to contain such separate drug pieces. Also, the compartment Ca**412** is tilted in the lateral direction. More specifically, the compartment Ca**412** has a bottom Ca**4121** tilted in the lateral direction, and a side wall Ca**4122** to contact one of the shorter sides of the cassette Ca**4** tilted in the lateral direction.

[0462] When the cassette Ca**4** is to be used by the user, the container Ca**41** with the sloping bottom Ca**4121** and the sloping side wall Ca**4122** is located in the cassette Ca**4** to have a shallower portion nearer the user. The cassette Ca**4** may contain one or more drug sheets in its body (portion without the container Ca**41**) and may contain any separate drug pieces in the cassette Ca**41**. This allows the user to easily determine the quantity of the drug and remove the drug. Also, when the user removes separate drug pieces, the separate drug pieces can slide along the sloping bottom Ca**4121** and the sloping side wall Ca**4122** to allow the user to easily take out the separate drug pieces.

[0463] The side wall Ca**4122** and the periphery **32***ed* of the drug receiver **32** may have substantially the same slope angle to allow the user to more easily take the drugs out of the container Ca**41**.

[0464] The slope Ca**413** is adjacent to one longer side of the container Ca**41** not in contact with one of the shorter sides of the cassette Ca**4**. The slope Ca**413** is located between the above longer side of container Ca**41** and the bottom Ca**4121** of the container Ca**41** and slopes in the lateral direction. When the user removes one or more drug sheets, the drug sheets can slide along the slope Ca**413** and be removed from the body of the cassette Ca, allowing the user to easily take out the drug sheets.

[0465] The container Ca**41** may have, on the bottom Ca**4121**, any number of ribs Ca**414**, which extend in the lateral direction (in which the drug is to be taken out). The ribs Ca**414** located in this manner can divide the compartment Ca**412** into multiple areas that each can contain any separate drug pieces. The ribs Ca**414** function as guides for the user to take out the drug stored in each of the different areas. This structure allows the user to more easily take out the drug.

[0466] Also, the cassette Ca**4** may include the container Ca**42** instead of the container Ca**41**. As shown in FIG. **37**, the container Ca**42** differs from the container Ca**41** in that it does not include the slope Ca**413** but includes rails Ca**421** along its shorter sides. Also, the protrusions Ca**40** in the cassette Ca**4** include grooves Ca**400**. Also, the cassette Ca**4** further includes one or more protrusion Ca**43**.

[0467] The container Ca**42** is supported with its rails Ca**421** placed on the protrusions Ca**40**. The rails Ca**421** of the container Ca**42** are engaged in the grooves Ca**400** on the container Ca**4**. The container Ca**42** is thus slidable along the grooves Ca**400**. In the container Ca**42** attached in the cassette Ca**4**, the rails Ca**421** are sandwiched between the grooves Ca**400** and the protrusions Ca**40**. The container Ca**42** is thus less likely to separate from the cassette Ca**4** when the container Ca**42** slides.

[0468] With the container Ca**42** including no slope Ca**413**, the cassette Ca**4** can contain one or more drug sheets under the container Ca**42** and thus contain more drug sheets. Also, when the user removes any separate drug pieces, the container Ca**42** is placed in contact with one of the shorter sides of the cassette Ca**4** to place such separate drug pieces nearer the user. When the user removes drug sheets, the container Ca**42** can be slid to allow the user to remove the drug sheets from the positions nearer the user.

[0469] The drug receiver **32** slopes. When the cassette Ca**4** has the container Ca**42** nearer the user, drug sheets are easily placed between the bottom surface of the container Ca**42** and the bottom surface of the cassette Ca**4**. During a picking operation, the container Ca**42** may obstruct the user removing drug sheets. However, the container Ca**42** is slidable, and can thus be moved to allow the user to easily remove drug sheets from the cassette Ca**4**.

[0470] Also, as shown in FIG. **38**, the cassette Ca**4** may include one or more partitions Ca**44** to define multiple compartments for containing drug sheets. The partitions Ca**44** are removable and are received in the slits Ca**45** to define multiple compartments.

[0471] Also, the cassette Ca**4** may include the container Ca**41** or the container Ca**42** in each compartment. The container Ca**41** or the container Ca**42** may be located in any manner easily usable by the user in the compartments. The cassette Ca**4** may include containers that are all containers Ca**41**, or all containers Ca**42**, or a combination of one or more containers Ca**41** and one or more containers Ca**42**. At least one of the multiple compartments may not include any container. The cassette Ca**4** may have a profile other than the profile of the large cassette Ca**1** shown in FIGS. **3**A to **3**D, and may have the profile of the medium-sized cassette Ca**2** or of the small cassette Ca**3**. In this case, the containers Ca**41** and Ca**42** have other shapes in accordance with the dimensions of the medium-sized cassette Ca**2** or the small cassette Ca**3**.

Cassette Gripper

[0472] Referring now to FIGS. **39** to **43**, an example structure of the cassette gripper **226** included in the main unit **2A** in the present embodiment will be described. FIG. **39** is a perspective view of an example cassette gripper **226**. In FIG. **39**, the portion **39001** shows the cassette gripper **226** with a lid **2267** at the uppermost position, and the portion **39002** shows the cassette gripper **226** with the lid **2267** at a position to come in contact with an upper surface of a cassette Ca (contact position).

[0473] FIGS. **40** and **41** are perspective views of an example drive **2270** for the cassette gripper **226** viewed from below. FIGS. **42** and **43** are cross-sectional views of the cassette gripper **226** describing an example operation of the lid **2267** for the cassette gripper **226**. The lid **2267** is at the uppermost position in the portion **40001** of FIG. **40** and in the portion **42001** of FIG. **42**. The lid **2267** is at the standby position in the portion **40002** of FIG. **40** and in the portion **42002** of FIG. **42**. A second moving unit **2272***b* (described later) is at a retracted position in the portion **41001** of FIG. **41** and in the portion **43001** of FIG. **43**. The lid **2267** is at the contact position in the portion **41002** of FIG. **41** and in the portion **43002** of FIG. **43**. To simplify the drawing, FIGS. **40** and **41** do not show some components of the drive **2270** including a bottom plate.

Structure of Cassette Gripper

[0474] The cassette gripper **226** has the same functions as the cassette gripper **221** in the first embodiment (refer to FIGS. **4**A, **4**B and **6**). More specifically, the cassette gripper **226** draws a cassette Ca from the cassette shelf **21** (refer to FIGS. **4**A and **4**B) or from the cassette holder **230** (refer to FIG. **44**), and grips the cassette Ca, as controlled by the main-cassette transporter controller **112**. The cassette gripper **226** also places the gripped cassette Ca onto the cassette shelf **21** or the cassette holder **230** for storage of the cassette Ca. Instead of the first cassette gripper **221***a* and the second cassette gripper **221***b* (refer to FIGS. **4**A, **4**B and **6**) in the first embodiment, the cassette gripper **226** is supported on the first post **224***a* and the second post **224***b* (refer to FIGS. **4**A and **4**B) in a slidable manner.

[0475] As shown in FIG. **39**, the cassette gripper **226** mainly includes a cassette support **2261**, a cassette drawer **2262**, a first drive **2263**, a first pulley **2264***a*, a second pulley **2264***b*, a first guide rail **2265**, and a position sensor **2266**. The cassette gripper **226** also includes a barcode sensor **2273**. Similarly to the cassette gripper **221**, the cassette gripper **226** further includes a rotary drive (not shown) that allows access to multiple cassette shelves **21** (e.g., two facing cassette shelves **21**).

[0476] The cassette support **2261** supports a cassette Ca when the cassette Ca is drawn by the cassette drawer **2262**.

[0477] Similarly to the cassette drawer **2211** (refer to FIG. **6**), the cassette drawer **2262** draws a cassette Ca placed on the cassette shelf **21** or the cassette holder **230** into the cassette gripper **226**. FIG. **39** shows the cassette Ca that has been drawn into the cassette gripper **226**.

[0478] As shown in the portion **42001** of FIG. **42**, the cassette drawer **2262** includes a tab **2262***a* to be engaged in a tab receiver Ca**12** in a cassette Ca. The cassette drawer **2262** draws a cassette Ca and places a cassette Ca onto the cassette shelf **21** or the cassette holder **230** in the same manner as the cassette gripper **226** described in the first embodiment. In FIGS. **42** and **43**, the tab **2262***a* is not engaged in the tab receiver Ca**12** in the cassette Ca.

[0479] The first drive **2263** moves the cassette drawer **2262** in the depth direction of the cassette gripper **226** (Y-direction). The first drive **2263** is, for example, a motor. The first pulley **2264***a* and the second pulley **2264***b* transmit a driving force generated by the first drive **2263** to the first guide rail **2265**. The rotational shaft of the first pulley **2264***a* is connected to the rotational shaft in the first drive **2263**. The rotational shaft of the second pulley **2264***b* is connected to one end of the first guide rail **2265**. The first pulley **2264***a* and the second pulley **2264***b* are connected to each other with a belt.

[0480] The first guide rail **2265** extends in the depth direction to allow the cassette drawer **2262** to be slidable. The first guide rail **2265** is connected to an underlying component of the cassette drawer **2262** (not shown) and axially rotates with a rotational force from the second pulley **2264***b* to move the cassette drawer **2262** in the depth direction.

[0481] Similarly to the position sensor **2214** (refer to FIG. **6**), the position sensor **2266** detects a cassette Ca located immediately in front of the cassette gripper **226** to be moved.

[0482] The barcode sensor **2273** reads a barcode on the cassette Ca to detect the identification and the orientation of the cassette Ca.

[0483] The cassette gripper **226** further includes the lid **2267**, a lifter **2268**, movable units **2269**, and the drive **2270**. The drive **2270** also operates as controlled by the main-cassette transporter controller **112**.

[0484] The lid **2267** functions as the lid of the cassette Ca. The lid **2267** is located above a cassette receptacle **2271** in the cassette gripper **226** in a manner movable in a direction (Z-direction) substantially perpendicular to the cassette receptacle **2271** for receiving the cassette Ca. With the lid **2267**, drug sheets and separate drug pieces are less likely to be shaken out of the cassette Ca during transportation of the cassette Ca.

[0485] The lifter **2268** is connected to the lid **2267** and to the cassette receptacle **2271** to move the lid **2267** in Z-direction with respect to the cassette receptacle **2271**. The lifter **2268** extends or retracts in Z-direction. To extend and retract in Z-direction, the lifter **2268** in the present

embodiment includes a link assembly including multiple links **2268***a* and multiple joints **2268***b*. In the present embodiment, the lifter **2268** includes the link assembly located between the two sides of the lid **2267** and the two sides of the cassette receptacle **2271**.

[0486] The movable units **2269** are supports connected to the lifter **2268** and the drive **2270** to allow movement of the lifter **2268** in Z-direction. In the present embodiment, each movable unit **2269** has one end connected to a single joint **2268***b* and the other end connected to a moving unit **2270***c* included in the drive **2270**. This allows the moving unit **2270***c* to move in the depth direction in cooperation with the movement of the movable units **2269**. For example, the moving unit **2270***c* moves to cause the lifter **2268** to extend or retract in Z-direction, and thus causes the lid **2267** to move in Z-direction. The moving unit **2270***c* may also move with the weight of the lid **2267** as it is moved by the lifter **2268** and the movable units **2269**.

Structure of Drive

[0487] The drive **2270** controls an extracting and retracting operation of the lifter **2268**. As shown in FIGS. **39** to **41**, the drive **2270** mainly includes a second guide rail **2270***a*, third guide rails **2270***b*, the moving unit **2270***c*, a second drive **2270***d*, a third pulley **2270***e*, a fourth pulley **2270***f*, and a position sensor **2270***g*. To simplify the drawing in FIGS. **40** and **41**, the second drive **2270***d* is shown in the portion **40001** of FIG. **40** alone.

[0488] The second guide rail **2270***a* and the third guide rails **2270***b* extend in the depth direction (Y-direction). This sliding assembly allows sliding of the moving unit **2270***c* on a screw on the second guide rail **2270***a*. In the present embodiment, the second guide rail **2270***a* including a screwed shaft is located in a middle portion of the drive **2270** and is sandwiched by the two third guide rails **2270***b* including shafts.

[0489] The second guide rail **2270***a* and the third guide rails **2270***b* are connected to the moving unit **2270***c*. The second guide rail **2270***a* axially rotates with a rotational force from the fourth pulley **2270***f* to move the moving unit **2270***c* in the depth direction. The lengths of the second guide rail **2270***a* and the third guide rails **2270***b* may be determined to allow the lid **2267** to move between the uppermost position and the contact position.

[0490] The moving unit **2270***c* moves along the second guide rail **2270***a* and the third guide rails **2270***b* to move the lifter **2268** in Z-direction through the movable units **2269**.

[0491] The second drive **2270***d* moves the moving unit **2270***c* in the depth direction. The second drive **2270***d* is, for example, a motor. The third pulley **2270***e* and the fourth pulley **2270***f* transmit a driving force generated by the second drive **2270***d* to the second guide rail **2270***a*. The rotational shaft of the third pulley **2270***e* is connected to the rotational shaft of the second drive **2270***d*. The rotational shaft of the fourth pulley **2270***f* is connected to one end of the second guide rail **2270***a*. The third pulley **2270***e* and the fourth pulley **2270***f* are connected to each other with a belt.

[0492] The position sensor **2270***g* detects a fixture **2272***d* (described later) to detect the positions of first moving units **2272***a* (described later), or in other words, the position of the moving unit **2270***c*. The main-cassette transporter controller **112** receives the detection result from the position sensor **2270***g* to determine the position of the lid **2267**.

[0493] In the present embodiment, the position sensor **2270***g* includes a first position sensor **2273***a*, a second position sensor **2273***b*, a third position sensor **2273***c*, and a fourth position sensor **2273***d*. The first the position sensor **2273***a* detects the second moving unit **2272***b* at the retracted position. The second position sensor **2273***b* detects the lid **2267** at the standby position.

[0494] The third position sensor **2273***c* detects the lid **2267** at a standby position set for the height of a cassette (a cassette with height h**1**) that is taller than the cassette Ca. The fourth position sensor **2273***d* detects the lid **2267** at a standby position set for a cassette taller than the cassette with the height h**1**, or specifically a cassette with a height h**2** (>h**1**).

[0495] At least one of the second position sensor **2273***b*, the third position sensor **2273***c*, and the fourth position sensor **2273***d* is to be located in accordance with the height of a cassette. In the present embodiment, the second position sensor **2273***b* may be located to detect the lid **2267** at the

standby position at the height of the cassette Ca.

[0496] As shown in FIGS. **40** and **41**, the moving unit **2270***c* mainly includes the first moving units **2272***a*, the second moving unit **2272***b*, springs **2272***c*, and the fixture **2272***d*.

[0497] The first moving units **2272***a* are connected to the third guide rails **2270***b* with bushes (not shown) and to a housing **2272***e* for the moving unit **2270***c*, but are not connected to the second guide rail **2270***a*. The second moving unit **2272***b* is connected to the second guide rail **2270***a* with a guide (nut) **2272***b***1** for receiving the screw on the second guide rail **2270***a*. The second moving unit **2272***b* is connected to the third guide rail **2270***b* with a bush (not shown), but is not connected to the housing **2272***e*. Also, the first moving unit **2272***a* and the second moving unit **2272***b* are not connected to each other.

[0498] The second moving unit **2272***b*, which is connected to the second guide rail **2270***a*, moves in the depth direction with a driving force received from the second drive **2270***d*. The first moving units **2272***a*, which are not connected to the second guide rail **2270***a*, are not driven directly by a driving force from the second drive **2270***d*. The first moving unit **2272***a* moves along the third guide rail **2270***b* in cooperation with the second moving unit **2272***b* while being in contact with the second moving unit **2272***b*.

[0499] The first moving units **2272***a*, which are connected to the housing **2272***e*, move together with the housing **2272***e*. The housing **2272***e* is connected to the movable units **2269**. The movable units **2269** are connected to the lifter **2268**, which is connected to the lid **2267**. Thus, the movement of the first moving units **2272***a* is interrelated with the raising and lowering of the lid **2267**. The second moving unit **2272***b* is not connected to the housing **2272***e* and thus may move independently of the housing **2272***e*, or specifically independently of the raising and lowering of the lid **2267**.

[0500] The springs **2272***c* are restricting members that restrict the raising of the lid **2267** at the contact position. The restricting members may be other elastic members that have the same functions as the springs **2272***c*. In the present embodiment, one spring **2272***c* is located on each of the two third guide rails **2270***b*.

[0501] The fixture **2272***d* is connected to each first moving unit **2272***a*. The fixture **2272***d* is detected by the position sensor **2270***g*.

Example Operation of Moving Unit

[0502] As shown in the portion **40001** of FIG. **40** and in the portion **42001** of FIG. **42**, the lid **2267** is up at the uppermost position when the moving unit **2270***c* is at a first end of the drive **2270** (an end in the +Y-direction). The uppermost position is the position of the lid **2267** spaced most apart from the cassette receptacle **2271**.

[0503] The second guide rail **2270***a* (sliding screw) rotates with a driving force from the second drive **2270***d*. The rotation is then transmitted to the guide **2272***b***1** in the second moving unit **2272***b*. The guide **2272***b***1** converts the rotation to linear movement, causing the second moving unit **2272***b* to move linearly along the second guide rail **2270***a*. The second moving unit **2272***b* presses the first moving unit **2272***a* while being in contact with the first moving unit **2272***a* to move the first moving unit **2272***a* in +Y-direction. The moving unit **2270***c* thus moves in +Y-direction. This movement lifts the lid **2267** upward through the housing **2272***e*, the movable units **2269**, and the lifter **2268**. More specifically, the lid **2267** is lifted to the uppermost position when the moving unit **2270***c* reaches the first end.

[0504] As shown in the portion **40002** of FIG. **40** and in the portion **42002** of FIG. **42**, the lid **2267** is at the standby position when the second position sensor **2273***b* detects the fixture **2272***d*. The standby position is the position of the lid **2267** to be on standby when the cassette Ca is placed from the cassette gripper **226** onto the cassette shelf **21** or onto the cassette holder **230**, or when the cassette Ca is drawn from the cassette shelf **21** or the cassette holder **230** into the cassette gripper **226**. The standby position is the position of the lid **2267** to be on standby during the placement or drawing of the cassette Ca. More specifically, the standby position may be relatively near but

remain spaced from the cassette Ca being placed or drawn and may not interfere with the movement of the cassette Ca.

[0505] To move the lid **2267** from the uppermost position to the standby position, the main-cassette transporter controller **112** controls the second drive **2270***d* to stop holding the lid **2267** at the uppermost position. This causes the lid **2267** to be lowered, for example, by its weight from the uppermost position. As the lid **2267** is lowered, the lifter **2268** retracts to move the housing **2272***e* in-Y-direction through the movable units **2269**. In cooperation with the movement of the housing **2272***e*, the first moving units **2272***a* move in-Y-direction. The first moving unit **2272***a* thus press the second moving unit **2272***b* while being in contact with the second moving unit **2272***b* to move the second moving unit **2272***b* in-Y-direction. The moving unit **2270***c* thus moves in-Y-direction. Subsequently, in response to the second position sensor **2273***b* detecting the fixture **2272***d*, the main-cassette transporter controller **112** drives the second drive **2270***d* to stop the lid **2267** at the standby position.

[0506] The second drive **2270***d* stops holding the lid **2267** at the standby position. This causes the lid **2267** to be lowered, for example, by its weight from the standby position. For example, when the cassette Ca is drawn into the cassette gripper **226**, the main-cassette transporter controller **112** lowers the lid **2267** from the standby position and places the lid **2267** in contact with the upper surface of the cassette Ca (the periphery of the cassette Ca).

[0507] The moving unit **2270***c* may move without relying on the weight of the lid **2267**. For example, the second drive **2270***d* may be driven to move the second moving unit **2272***b* in-Y-direction to move the moving unit **2270***c*. In this case, the second drive **2270***d* may be driven to move the second moving unit **2272***b* in-Y-direction. This movement, as well as the weight of the lid **2267**, may move the first moving units **2272***a* in-Y-direction while the first moving unit **2272***a* is in contact with the second moving unit **2272***b*.

[0508] The lid **2267** stops being lowered when coming in contact with the upper surface of the cassette Ca. The portion **41002** of FIG. **41** and the portion **43002** of FIG. **43** show the lid **2267** in this state, or stopped at the contact position. When the lid **2267** is stopped, the moving unit **2270***c* stops moving in-Y-direction. The first moving units **2272***a*, which are connected to the housing **2272***e*, also stop moving when the lid **2267** is stopped.

[0509] The second drive **2270***d* is driven to move the second moving unit **2272***b* in-Y-direction to compress the spring **2272***c*. The portion **41001** of FIG. **41** and the portion **43001** of FIG. **43** show the spring **2272***c* being compressed by the second moving unit **2272***b* in this state, or at the retracted position. In this state, the cassette gripper **226** transports the cassette Ca placed on the cassette receptacle **2271** while holding the cassette Ca with the lid **2267** under the force from the springs **2272***c* and the weight of the lid **2267**.

[0510] As the second moving unit **2272***b* compresses the spring **2272***c* as described above, the moving unit **2270***c* under the compressing force can more easily be secured at the position corresponding to the contact position at which the lid **2267** is stopped (a second end of the drive **2270** in-Y-direction). Thus, the moving unit **2270***c* is less easily movable in +Y-direction. More specifically, this reduces movement of the lid **2267** away from the contact position (the upward movement of the lid **2267**) under vibrations or other factors while the cassette gripper **226** grips and transports the cassette Ca. This reduces the likelihood that drug sheets or any separate drug pieces drop from the cassette Ca.

[0511] The springs **2272***c* eliminate a highly precise operation of the second drive **2270***d* for, for example, stopping the lid **2267** in response to coming in contact with the upper surface of the cassette Ca when the second drive **2270***d* is driven to lower the lid **2267**. Thus, the lid **2267** can hold the cassette Ca without the second drive **2270***d* performing an operation with higher precision for stopping the lid **2267**.

[0512] The springs **2272***c* each may have a length and a tension to cause the second moving unit **2272***b* compressing the spring **2272***c* to return to the position at which the second moving unit

2272*b* comes in contact with the first moving unit **2272***a*.

[0513] To move the lid **2267** at the position to hold the cassette Ca to the uppermost position or to the standby position, the main-cassette transporter controller **112** drives the second drive **2270***d* to move the moving unit **2270***c* in +Y-direction.

Modifications

[0514] The cassette gripper **226** may include the lid **2267** and the lifter **2268** for raising and lowering the lid **2267**. More specifically, the lifter **2268** may be any device that can raise and lower the lid **2267**. The device for operating the lifter **2268** (e.g., the movable units **2269** and the drive **2270**) may be modified as appropriate for the structure of the lifter **2268**.

[0515] For example, the lifter **2268** in the present embodiment includes a link assembly shown in FIG. **39** (a pantograph) used for, for example, a toy grabber, but may include any other link assembly that can raise and lower the lid **2267**.

[0516] Also, the lifter **2268** may have a structure other than a link assembly. For example, the lifter **2268** may include a support rod that extends vertically to support the lid **2267** partially (e.g., at four corners of the lid **2267**) in a slidable manner. The lifter **2268** with this structure can also raise and lower the lid **2267** along the support rod.

[0517] In this case, the length of the support rod is not changeable. Thus, when the lid **2267** is lowered from the uppermost position, the support rod protrudes from the lid **2267** in +Z-direction. During transportation of the cassette Ca, for example, the protruding portion of the support rod in one cassette gripper may hit (or interfere with) the first main cassette transporter **22***a*, the second main cassette transporter **22***b*, or the other cassette gripper. To avoid this, the lifter **2268** may be located under the lid **2267** as in the link assembly in the present embodiment and may be extendable and retractable in accordance with the vertical position of the lid **2267**.

Cassette Holder

Structure of Cassette Holder

[0518] The structure of the cassette holder **230** included in the main unit **2**A will now be described. FIG. **44** is a view of the cassette holder **230** showing its example structure. FIG. **45** is a view of a receiver unit **241** included in the cassette holder **230** showing its example structure. To simplify the drawing, FIG. **44** does not show the internal structure of the picking unit **3**A (the structure of the picking cassette transporter **35**).

[0519] The cassette holder **230** is a temporary holder (buffer) for holding a cassette Ca transported from either the cassette shelf **21** or the drug receiver **32** in the picking unit **3**A, similarly to the cassette holder **23** in the first embodiment. As shown in FIG. **44**, the cassette holder **230** includes a main unit **240** and a sub-unit **250**. The cassette holder **230** may hold a cassette Ca selected from any of a large cassette Ca**1**, a medium-sized cassette Ca**2**, a small cassette Ca**3**, and a cassette Ca**4**.

[0520] The main unit **240** includes multiple receiver units **241** for transporting and receiving cassettes Ca and a housing **242** storing the receiver units **241**. The main unit **240** temporarily stores cassettes Ca. The main unit **240** is a cassette holder corresponding to the first cassette holder **23***a* (refer to FIG. **9**) for transporting and receiving cassettes Ca to and from the first drug receiver **32***a*. The main unit **240** temporarily holds cassettes Ca during, for example, automated dispensing of drug sheets.

[0521] In the present embodiment, the main unit **240** includes five receiver units **241**. In some embodiments, the main unit **240** may include a different number of receiver units **241** as appropriate for, for example, the dimensions of the main unit **2**A or the picking unit **3**A or the efficiency of automated dispensing of drug sheets. Each of such multiple receiver units **241** can hold a cassette Ca, thus enabling efficient dispensing of drug sheets. The main unit **240** may include a single receiver unit **241**. In this case, the main unit uses less space.

[0522] As shown in FIG. **45**, the receiver unit **241** temporarily holds a cassette Ca for transportation and reception between the main unit **2**A and the first drug receiver **32***a*. The receiver unit **241** mainly includes a transporting cassette holder **243**, a returning cassette holder (retracting

unit) **244**, a returning cassette mover **245**, a cassette sensor **246**, and a retracting unit sensor **247**. The returning cassette mover **245** may be controlled by the main unit controller **11** or the picking unit controller **12**.

[0523] In the receiver unit **241**, the returning cassette holder **244** is at a retracting position R to which the returning cassette holder **244** is to be retracted in an initial state (at least holding no cassette Ca). When a cassette Ca is returned from the drug receiver **32**, the returning cassette holder **244** moves from the retracting position R to a receiving position Q at which the returning cassette holder **244** transports or receives a cassette Ca to or from the picking unit **3**A. The returning cassette holder **244** can thus receive a cassette Ca from the picking cassette transporter **35** in the picking unit **3**A. After receiving the cassette Ca from the picking cassette transporter **35**, the returning cassette holder **244** is retracted from the receiving position Q to the retracting position R. The receiving position Q is then unoccupied. The transporting cassette holder **243** can thus receive another cassette Ca from the main cassette transporter **22** in the main unit **2**A. The cassette Ca held by the returning cassette holder **244** at the retracting position R is then returned by the main cassette transporter **22** to the cassette shelf **21**. The retracting position R can be referred to as a returning position to return a cassette Ca to the cassette shelf **21**.

[0524] The transporting cassette holder **243** is a receptacle to temporarily store a cassette Ca removed from the cassette shelf **21** and to be transported to the drug receiver **32**. The transporting cassette holder **243** is at the receiving position Q.

[0525] The returning cassette holder **244** temporarily holds a cassette Ca to be returned from the drug receiver **32** to the cassette shelf **21**. The returning cassette holder **244** is movable between the retracting position R and the receiving position Q as driven by the returning cassette mover **245**.

[0526] The returning cassette holder **244** mainly includes a returned-cassette holder **2441**, a top plate **2442**, rail connectors **2443**, sensor fixtures **2444***a* and **2444***b*, and a belt connector **2445**.

[0527] The returned-cassette holder **2441** holds a cassette Ca returned from each picking unit **3**. The returned-cassette holder **2441** can receive a cassette Ca. The returned-cassette holder **2441** is sized and shaped to allow the returning cassette mover **245** to move the returning cassette holder **244**.

[0528] The top plate **2442** at least partially covers the upper surface of the returned-cassette holder **2441**. The rail connectors **2443** connects the top plate **2442** to guide rails **2454** included in the returning cassette mover **245**. The belt connector **2445** connects the top plate **2442** to a belt **2452** included in the returning cassette mover **245**.

[0529] The sensor fixtures **2444***a* and **2444***b* are detected by the retracting unit sensor **247**. The sensor fixture **2444***a* is detected by a second sensor **2472** included in the retracting unit sensor **247** when the returning cassette holder **244** is placed at the retracting position R. The sensor fixture **2444***b* is detected by a first sensor **2471** included in the retracting unit sensor **247** when the returning cassette holder **244** is placed at the receiving position Q. The sensor fixtures **2444***a* and **2444***b* are on the top plate **2442** to be detectable by the retracting unit sensor **247** when the returning cassette holder **244** is placed at the retracting position R or the receiving position Q.

[0530] The belt **2452** moves as a drive **2453** is driven. The belt connector **2445** connected to the belt **2452** also moves. This movement moves the top plate **2442** connected to the belt connector **2445** along the guide rails **2454** connected to the top plate **2442**. Thus, the returned-cassette holder **2441** connected to the top plate **2442** also moves along the guide rails **2454**. In this manner, the returning cassette holder **244** is movable between the retracting position R and the receiving position Q.

[0531] The returning cassette mover **245** moves the returning cassette holder **244** between the receiving position Q and the retracting position R. The returning cassette mover **245** mainly includes two pulleys **2451**, the belt **2452**, the drive **2453**, and the guide rails **2454**.

[0532] The pulleys **2451** rotate with a driving force generated by the drive **2453** to drive the belt **2452**. The belt **2452** is suspended on the two pulleys **2451**. The belt **2452** rotates between the

pulleys **2451** as the pulleys **2451** rotate. The drive **2453** applies a driving force to the pulleys **2451** to rotate the belt **2452**. The drive **2453** is, for example, a motor. The guide rails **2454** are suspended on the housing **242** in the main unit **240** to allow the returning cassette holder **244** to be movable between the receiving position Q and the retracting position R.

[0533] The cassette sensor **246** detects a cassette Ca. The main unit **240** includes, as the cassette sensor **246**, a first cassette sensor **2461** and a second cassette sensor **2462**. The first cassette sensor **2461** is located at a position in the housing **242** corresponding to the receiving position Q (position facing the transporting cassette holder **243**) and detects a cassette Ca that is at the receiving position Q. The second cassette sensor **2462** is located at a position in the housing **242** corresponding to the retracting position R and detects a cassette Ca that is at the retracting position Q.

[0534] The first cassette sensor **2461** and the second cassette sensor **2462** input the detection result into the control unit **10**. The control unit **10** determines whether any cassette Ca is at the receiving position Q or the retracting position R based on the detection result.

[0535] The retracting unit sensor **247** detects the returning cassette holder **244**. The main unit **240** includes, as the retracting unit sensor **247**, the first sensor **2471** and the second sensor **2472**. The first sensor **2471** detects the returning cassette holder **244** that is at the receiving position Q. The second sensor **2472** detects the returning cassette holder **244** that is at the retracting position R. The first sensor **2471** and the second sensor **2472** are located to detect the sensor fixture **2444***b* or the sensor fixture **2444***a* in the housing **242**. The first sensor **2471** and the second sensor **2472** form, for example, a light transmissive sensor including a light source for emitting light and a light detector for detecting the emitted light.

[0536] The first sensor **2471** and the second sensor **2472** input the detection result into the control unit **10**. The control unit **10** determines whether the returning cassette holder **244** is at the receiving position Q or the retracting position R based on the detection result.

[0537] The sub-unit **250** is a cassette holder corresponding to the second cassette holder **23***b* shown in FIG. **9**. The sub-unit **250** is used for, for example, dispensing or loading selected drug sheets as an interrupt during a picking operation or a loading operation in automated dispensing of drug sheets performed using the main unit **240**. More specifically, the sub-unit **250** is a cassette holder for performing an operation different from the operation performed by the main unit **240** at the same time as the operation performed by the main unit **240**. The sub-unit **250** may have the same structure as the main unit **240**.

Operation of Cassette Holder

[0538] An example operation of the cassette holder **230** included in the main unit **2**A will now be described. FIG. **46** is a diagram describing an example operation of the cassette holder **230**. At the start of the operation performed by the cassette holder **230**, the returning cassette holder **244** is at the retracting position R.

[0539] As shown in the portion **46001** of FIG. **46**, the main cassette transporter **22** transports a cassette Ca containing one or more drug sheets to be handled from the cassette shelf **21** to the cassette holder **230**. The cassette Ca is then placed onto the transporting cassette holder **243** at the receiving position Q.

[0540] The cassette Ca placed on the transporting cassette holder **243** is transported by the picking cassette transporter **35** to the drug receiver **32**. A picking operation is then performed on the cassette Ca. During the picking operation, the drive **2453** for the returning cassette mover **245** is driven to operate the pulleys **2451**. This then rotates the belt **2452**. As the belt **2452** rotates, the returning cassette holder **244** connected to the belt **2452** with the belt connector **2445** moves from the retracting position R to the receiving position Q as shown in the portion **46002** of FIG. **46**.

[0541] After the picking operation, the picking cassette transporter **35** transports the cassette Ca from the drug receiver **32** to the receiving position Q of the cassette holder **230**. As shown in the portion **46003** of FIG. **46**, the returning cassette holder **244** is at the receiving position Q. The

cassette Ca is thus placed on the returned-cassette holder **2441** in the returning cassette holder **244**.

[0542] In response to the cassette Ca being placed on the returning cassette holder **244**, the returning cassette mover **245** rotates the belt **2452** in the direction opposite to the rotating direction used for the transportation from the retracting position R to the receiving position Q. The returning cassette mover **245** thus moves (retracts) the returning cassette holder **244** from the receiving position Q to the retracting position R as shown in the portion **46004** of FIG. **46**. As a result, the transporting cassette holder **243** at the receiving position Q can receive another cassette Ca transported from the cassette shelf **21**.

[0543] As shown in the portion **46005** of FIG. **46**, after the returning cassette holder **244** moves to the retracting position R, the cassette Ca held by the returning cassette holder **244** is returned to the cassette shelf **21** by the main cassette transporter **22**. The same operation is repeated subsequently for automated dispensing of drug sheets of multiple drug types.

[0544] In the present embodiment, the cassette holder **230** includes the multiple receiver units **241**. For example, the cassette holder **230** may include two receiver units **241** (a receiver unit **241**X and a receiver unit **241**Y). In this case, a cassette Ca is transported from the receiver unit **241**X to the drug receiver **32**. During a picking operation on the cassette Ca, the main cassette transporter **22** transports another cassette Ca from the cassette shelf **21** to the receiver unit **241**Y that causes the other cassette Ca to be on standby. While the receiver unit **241**X is receiving the cassette Ca after the picking operation, the main cassette transporter **22** transports another cassette Ca from the receiver unit **241**Y to the drug receiver **32**. In this manner, the multiple receiver units **241** improve the efficiency of the picking operation.

Fourth Embodiment

[0545] A drug station according to the present embodiment will be described focusing on its differences from the drug station **1**A including the main unit **2**A and the picking unit **3**A shown in FIG. **31** described in the third embodiment.

Structure of Picking Unit

[0546] FIG. **47** is a view of the picking unit **3**A showing its example structure. The barcode reader **34**, which is located on the side surface of the picking unit **3**A adjacent to the standing position of the user in FIG. **33**, may be located on the upper surface **3**up of the worktable **36** in the picking unit **3**A in FIG. **47**. This structure improves the efficiency of an operation for, for example, loading a drug into a cassette Ca placed on the drug receiver **32** after the barcode is read by the barcode reader **34**. The printer **1013** may also be located on the upper surface **3**up. In this case, the user can more easily access printed matter, such as journal data printed on a sheet, output from the printer **1013**. Each picking unit **3** in the first embodiment may also include the barcode reader **34** and the printer **1013** arranged as described above.

[0547] Also, the second touchscreen **31** and the image sensor **335** in the picking unit **3**A are hinged on the upper surface **3**up in a manner tiltable toward the worktable **36**. The second touchscreen **31** and the image sensor **335** are tilted toward the worktable **36** to allow opening and closing of the doors **25** of the main unit **2**A (refer to FIGS. **31** and **48**) at positions corresponding to the second touchscreen **31** and the image sensor **335**. The printer **1013** is also installed on the upper surface **3**up in a manner tiltable toward the worktable **36**. The printer **1013** is tilted toward the worktable **36** to avoid being hit by the doors **25** when the closed doors **25** are open at an angle of up to about 180 degrees.

Storage of Drugs in Main Unit

[0548] Drugs are typically boxed before delivered to hospitals or pharmacies. For example, drug sheets (e.g., PTP sheets) may be packaged in units of several sheets (by pillow packaging), and then are further boxed for delivery. Cream tubes containing creams, eyedrops, or powdered drug packs containing powdered drugs (e.g., powdered herbal medicines) may be directly boxed for delivery.

[0549] Drugs storable in cassettes Ca in the main unit **2**A are not limited to drugs in particular

forms, such as drug sheets, cream tubes, eyedrops, or powdered drug packs (specifically, unboxed or unpackaged drugs). The cassettes Ca may also contain either packaged or boxed drugs. More specifically, the cassettes Ca may contain (1) boxes, (2) unboxed packages containing drugs, or (3) unpackaged drugs. In other words, a picking operation or a loading operation may be performed on boxed drugs or packaged drugs, other than the drugs in particular forms. Drugs herein refer to the drugs in particular forms, packages containing the drugs in particular forms, and boxes containing such packages. Also, the drugs in particular forms or the packages may also refer to individually packed drugs that have been packed by a drug packer, such as individually packed powdered drugs or tablets.

[0550] The main unit **2**A storing unboxed or unpackaged drugs may place less workloads on the user performing a picking operation. The main unit **2**A storing boxed or packaged drugs that are directly provided from drug manufacturers may place less workloads on the user performing a loading operation. Such boxed or packaged drugs can be managed in units of several packages or several pieces in cassettes Ca and are also storable in a manner shielded from light. In particular, boxed drugs managed without being unboxed are returnable to a party that has delivered the drugs. In other words, such drugs can be stored in the main unit **2**A in a returnable form.

[0551] The main unit **2**A may store each drug in a form set for each drug type (selected from forms (**1**) to (**3**) above). In this case, the control unit **10** (refer to FIG. **2**) may specify, for example, the form of storage for each drug to be loaded, and may display the specified form of storage on the second touchscreen **31**. This informs the user of the form of storage for each drug type.

[0552] The main unit **2** in the first embodiment may also store boxed or packaged drugs in addition to the drugs in particular forms.

Control in Main Unit

[0553] FIG. **48** is a front view of an example main unit **2**A and an example picking unit **3**A. For ease of explanation, the doors **25** corresponding to the position of the picking unit **3**A are open in FIG. **48**. In FIG. **48**, the second touchscreen **31** and the image sensor **335** are tilted toward the worktable **36**, whereas the printer **1013** is upright with respect to the worktable **36** (without being tilted toward the worktable **36**).

[0554] As shown in FIG. **48**, the main unit **2**A may include a temporary transporting cassette holder **215**. When the transporting cassette holder **243** (refer to FIGS. **44** and **45**) holds a cassette Ca and thus cannot hold another cassette Ca, the temporary transporting cassette holder **215** can temporarily hold another cassette Ca to be transported to the transporting cassette holder **243**. For example, any cassette receiving part in the cassette shelf **21** to allow the main cassette transporter **22** (refer to FIG. **2**) to easily access the picking unit **3**A can function as the temporary transporting cassette holder **215**.

[0555] In the present embodiment, multiple cassette shelf plates **211** adjacent to the picking unit **3**A corresponding to an upper position of the picking unit **3**A each function as the temporary transporting cassette holder **215**. More specifically, these cassette shelf plates **211** that allow easy access to the picking unit **3**A each function as the temporary transporting cassette holder **215**.

[0556] The cassette shelf plates **211** that each function as the temporary transporting cassette holder **215** store cassettes Ca containing drugs with higher frequencies of use in a normal drug dispensing operation (picking operation). When the user performs a loading operation, the main cassette transporter **22** preliminary retracts each cassette Ca with a higher frequency of use temporarily into a distant place (onto a cassette shelf plate **211** different from the temporary transporting cassette holder **215**). The main cassette transporter **22** can thus use a space corresponding to the number of drugs (the number of drug types) handled in a single loading operation at a position easily accessed by the picking unit **3**A. The drug station **1**A can thus be prepared for the loading operation. In response to completion of the loading operation, the main cassette transporter **22** returns the cassette Ca with the higher frequency of use placed at the distant position to the temporary transporting cassette holder **215** (specifically, to the previous placement position of the cassette)

during an idling time. When any cassette Ca is on the temporary transporting cassette holder **215**, the main cassette transporter **22** returns the cassette Ca to the previous position and returns the cassette Ca with the higher frequency of use onto the temporary transporting cassette holder **215** (specifically, to the previous position).

[0557] For example, any cassette receiving part that allows the main cassette transporter **22** to easily access the picking unit **3**A can function as the temporary transporting cassette holder **215**. For example, when the drug station **1**A is viewed from the front, a cassette receiving part in the cassette shelf **21** adjacent to the picking unit **3**A in the horizontal direction (X-direction) may function as the temporary transporting cassette holder **215**.

[0558] The drug station **1**A has a bulk loading mode for loading a bulk of many drugs at a time. For example, the user may select the bulk loading mode when loading drugs delivered to a hospital or a pharmacy into the main unit **2**A.

[0559] When the bulk loading mode is selected, the main unit controller **11** (refer to FIG. **2**) specifies cassette receiving parts that each function as the temporary transporting cassette holder **215**. The main unit controller **11** controls the main cassette transporter **22** to move cassettes Ca placed in the cassette receiving parts to unoccupied cassette receiving parts. A cassette receiving part that functions as the temporary transporting cassette holder **215** can thus temporarily hold a cassette Ca to be transported to the transporting cassette holder **243**.

[0560] In response to the bulk loading mode being selected, the main unit controller **11** obtains information about drugs to be stored into the main unit **2**A from the storage management system based on delivery data about the delivered drugs, and stores the obtained information into the memory **15**. When finding no cassette Ca containing any drug indicated by the information obtained from the storage management system, the main unit controller **11** associates drug identification information about the drug with cassette identification information about an unoccupied cassette Ca.

[0561] In response to an input operation for starting loading drugs into the main unit **2**A, the main unit controller **11** controls the main cassette transporter **22** to transport cassettes Ca containing the drugs to be loaded, sequentially from each cassette receiving part to the transporting cassette holder **243**. The drugs to be loaded are indicated by the obtained information based on the delivery data. The picking unit controller **12** controls the picking cassette transporter **35** (refer to FIG. **2**) to transport the cassettes Ca held on the transporting cassette holder **243** sequentially to the drug receiver **32**. Also, the picking unit controller **12** transports each cassette Ca on which the loading operation has been complete to the returning cassette holder **244** (refer to FIGS. **44** and **45**). The main unit controller **11** transports (returns) the cassette Ca to the cassette receiving part previously storing the cassette Ca.

[0562] In the above process, the main unit controller **11** determines whether the transporting cassette holder **243** can hold a cassette Ca when determining the transport destination of the cassette Ca. In the present embodiment, the main unit controller **11** determines whether the cassette Ca can be held by any of the multiple transporting cassette holders **243** (five in the example shown in FIGS. **44** and **45**), or specifically determines whether any of the transporting cassette holders **243** becomes unoccupied. When determining that no transporting cassette holder **243** can hold a cassette Ca, the main unit controller **11** determines, as the transport destination of the cassette Ca, one of the cassette receiving parts in the cassette shelf **21** to be the temporary transporting cassette holder **215**. The main unit controller **11** transports the cassette Ca to the cassette receiving part determined to be the transport destination.

[0563] The bulk loading mode may be selected, for example, on a bulk loading mode selection button on the loading screen image **20001** shown in FIG. **20**. For example, in response to an input operation on the bulk loading mode button, the main unit controller **11** may obtain information, indicated by delivery data, about drugs to be loaded into the main unit **2**A from the storage management system. The touchscreen controller **14** causes the obtained information to appear in

the retrieval result display area A**643** on the loading screen image **20001**. Subsequently, in response to an input operation on the cassette move button A**645**, the main unit controller **11** controls the main cassette transporter **22** to start transporting the cassettes Ca containing the drugs to be loaded to the cassette holder **230** (refer to FIG. **44**).

[0564] The drug station **1**A with the functions described above may be expressed in the following forms. The drug station **1**A (cassette transporting apparatus) includes the cassette shelf **21**, the drug receiver **32**, and the transporting cassette holder **243**. When the transporting cassette holder **243** holds a cassette Ca in the drug station **1**A, a part of the cassette shelf **21** that allows easy access by the transporting cassette holder **243** functions as the temporary transporting cassette holder **215**. The temporary transporting cassette holder **215** temporarily holds a cassette Ca to be removed from a position different from the part of the cassette shelf **21** and to be transported to the transporting cassette holder **243**. The transporting cassette holder **243** holding a cassette Ca includes, for example, multiple transporting cassette holders **243** each holding a cassette Ca.

[0565] For example, a loading operation can take much time for loading a bulk of many drugs into the cassette shelf **21**, for example, for loading delivered drugs into the cassette shelf **21**. For loading a bulk of many drugs into the cassette shelf **21**, the main unit controller **11** sequentially transports cassettes Ca containing the drugs to be loaded to the transporting cassette holders **243**. However, once the transporting cassette holders **243** cannot hold any cassettes Ca (e.g., each of the multiple transporting cassette holder **243** has already held a cassette Ca), the main unit controller **11** cannot transport any cassette until any of the transporting cassette holders **243** becomes unoccupied.

[0566] As described above, when the transporting cassette holders **243** cannot hold any cassettes Ca in the drug station **1**A, a part of the cassette shelf **21** that allows easy access by the transporting cassette holders **243** can function as the temporary transporting cassette holder **215**. The cassette Ca to be transported to the drug receiver **32** can thus be held temporarily near the transporting cassette holders **243**. The drug station **1**A can shorten the time for the cassette transportation to the transporting cassette holder **243**, and reduces the likelihood that a cassette Ca to be transported cannot be held on any transporting cassette holder **243**. The drug station **1**A can aid the user in performing a loading operation more efficiently.

[0567] Also, the main unit controller **11** may control the main cassette transporter **22** to remove cassettes Ca from the cassette shelf **21** in the order of delivery of the drugs.

[0568] For drugs delivered to a hospital or a pharmacy, the storage management system receives sets of information about the drugs in the order of their delivery. The delivery data lists the sets of information in the order of their input. The user loads the drugs into the main unit **2**A after checking the delivered drugs by referring to the printed matter representing the delivery data (a list of drugs delivered).

[0569] Thus, a loading waiting time occurs for the user from when the barcode on each drug checked by the user is read by the barcode reader **34** to when the cassette Ca containing the drug is removed from the cassette shelf **21** and transported to the drug receiver **32**. The loading waiting time can be lengthy depending on the placement position of the cassette Ca in the cassette shelf **21**.

[0570] In response to an input operation for starting loading the delivered drugs (e.g., an operation for selecting the bulk loading mode), the main unit controller **11** obtains information about the drugs to be stored into the main unit **2**A based on the delivery data, and stores the information into the memory **15**. The main unit controller **11** also obtains, from the storage management system, order information indicating the order in which sets of information have been input into the storage management system (the order of delivery), and stores the obtained information into the memory **15**. When finding no cassette Ca containing any drug indicated by the information obtained from the storage management system, the main unit controller **11** associates drug identification information about the drug with cassette identification information about an unoccupied cassette Ca.

[0571] In response to an input operation for starting loading into the main unit **2**A, the main unit

controller **11** controls the main cassette transporter **22** to transport cassettes Ca containing the drugs to be loaded in the order indicated by the order information from the cassette shelf **21** to the transporting cassette holder **243**. The picking unit controller **12** controls the picking cassette transporter **35** to transport each cassette Ca held on the transporting cassette holder **243** to the drug receiver **32** or to the standby position P**2** (refer to FIGS. **11**A to **11**E and **12**A to **12**H) by following the process described above. When the cassette Ca is transported to the standby position P**2**, the picking unit controller **12** transports the cassette Ca from the standby position P**2** to the drug receiver **32** by following the process described above.

[0572] The order of drugs indicated on the printed matter is the same as the order of input of the sets of information into the storage management system (the order indicated by the order information). The user checks the drugs in this order. The main unit controller **11** and the picking unit controller **12** can thus place each cassette Ca on the transporting cassette holder **243** or at the standby position P**2** in the order in which the drugs have been checked. The picking unit controller **12** then transports each cassette Ca from the cassette holder **230** or the standby position P**2** to the drug receiver **32** in the order in which the drugs have been checked. Thus, the main unit controller **11** and the picking unit controller **12** can shorten the time to transport each cassette Ca from the cassette shelf **21** and can shorten the time for the loading operation.

[0573] The drug station **1** according to the first embodiment may also have a part of the cassette shelf **21** functioning as the temporary transporting cassette holder **215**. The drug station **1** according to the first embodiment may also transport the cassettes Ca stored in the cassette shelf **21** in the order of the input into the storage management system (in the order of the delivery) to the transporting cassette holder **243** and to the drug receiver **32**. Transporting the cassettes Ca to the drug receiver **32** includes placing the cassettes Ca at the standby position P**2** before transporting the cassettes Ca to the drug receiver **32**.

Control in Picking Unit

[0574] Timing for Opening and Closing Shutter between First Drug Receiver and Second Drug Receiver

[0575] As shown in FIGS. **33** and **47**, the picking unit **3**A includes the drug receivers **32** including the first drug receiver **32***a* and the second drug receiver **32***b*. The picking unit controller **12** can transport cassettes Ca to both the first drug receiver **32***a* and second drug receiver **32***b*.

[0576] When one of the shutter **322** for the first drug receiver **32***a* and the shutter **322** for the second drug receiver **32***b* is open, the picking unit controller **12** maintains the other shutter **322** to be closed, instead of opening the other shutter **322**. More specifically, the picking unit controller **12** opens one of the shutter **322** for the first drug receiver **32***a* and the shutter **322** for the second drug receiver **32***b* although cassettes Ca have reached both the first drug receiver **32***a* and the second drug receiver **32***b*. When, for example, selected drugs are dispensed or loaded (a selected dispensing operation or a selected loading operation is performed) as an interrupt during a picking operation, the picking unit controller **12** controls the shutters **322** to be open and closed in the manner described above. A loading operation independent of the picking operation may also be performed in the above manner.

[0577] When the first drug receiver **32***a* and the second drug receiver **32***b* are both open, the user can access two cassettes Ca and may select an incorrect cassette Ca from which or into which a drug is to be removed or loaded. Such an error can be reduced by opening one of the shutter **322** for the first drug receiver **32***a* and the shutter **322** for the second drug receiver **32***b*.

[0578] During a loading operation that is not a selected loading operation, for example, the picking unit controller **12** may transport cassettes Ca to both the first drug receiver **32***a* and the second drug receiver **32***b*. In this case, the picking unit controller **12** controls the shutters **322** to be open and closed in the manner as described above to alternately open and close the shutter **322** for the first drug receiver **32***a* and the shutter **322** for the second drug receiver **32***b*. The user can thus access the cassettes Ca transported to the first drug receiver **32***a* and the second drug receiver **32***b*

alternately for an efficient loading operation.

[0579] The drug station **1** according to the first embodiment may also use the opening and closing timing of the shutters **322** described above.

Control for Opening Shutter with Barcode Reading

[0580] The picking unit controller **12** may open the shutter **322** after the barcode is read either once or twice by the barcode reader **34**.

[0581] For a loading operation (including a selected drug loading operation), for example, the main unit controller **11** specifies a cassette Ca (cassette Ca containing a drug to be loaded) corresponding to drug identification information indicated by a barcode (e.g., a GS**1** barcode) read by the barcode reader **34**. The main unit controller **11** transports the specified cassette Ca to the cassette holder **230**. The picking unit controller **12** transports, to the drug receiver **32**, the cassette Ca transported to the cassette holder **230**.

[0582] The shutter **322** is to be open after the first reading of the barcode. With the barcode read, the picking unit controller **12** transports the cassette Ca to the drug receiver **32** and then opens the shutter **322**. Subsequently, when the barcode is read again, the picking unit controller **12** determines whether the drug identification information indicated by the barcode matches the drug identification information associated with the cassette Ca. The touchscreen controller **14** displays the determination result on the second touchscreen **31**.

[0583] In response to viewing the determination result indicating a match between the two sets of drug identification information, the user loads the drug into the cassette Ca. In response to viewing the determination result indicating a mismatch between the two sets of drug identification information, the user checks whether the drug to be loaded into the cassette Ca is correct, without loading the drug into the cassette Ca.

[0584] In this manner, when the picking unit controller **12** opens the shutter **322** after the barcode is read once, the user can perform the loading operation efficiently. The appearing determination result allows the user to load the drug into the cassette Ca although the picking unit controller **12** opens the shutter **322** after the first reading of the barcode.

[0585] The shutter **322** is to be open after the second reading of the barcode. In this case, the picking unit controller **12** transports the cassette Ca to the drug receiver **32** and then waits for the barcode reader **34** to read the barcode again. When the barcode is read again, the picking unit controller **12** determines whether the drug identification information indicated by the barcode matches the drug identification information associated with the cassette Ca.

[0586] When the two sets of drug identification information match, the picking unit controller **12** opens the shutter **322**. In this case, the user loads the drug into the cassette Ca. When the two sets of drug identification information do not match, the touchscreen controller **14** displays an image indicating the mismatch between the two sets of drug identification information. In this case, the user checks whether the drug to be loaded into the cassette Ca is correct, without loading the drug into the cassette Ca.

[0587] In this manner, when the shutter **322** is to be open after the second reading of the barcode, the picking unit controller **12** opens the cassette Ca after the two sets of drug identification information match. This reduces the likelihood of erroneous loading into the cassette Ca performed by the user.

[0588] In some embodiments, the picking unit controller **12** may open the shutter **322** after the second reading of the barcode without waiting for the determination result to appear. In this case, the touchscreen controller **14** may display the determination result on the second touchscreen **31** to prevent erroneous loading performed by the user.

[0589] The determination result may be provided to the user in any manner. The determination result may not appear on the second touchscreen **31** but may be provided by using an illumination pattern, or by turning on and off, for example, the tray close button (shutter closing button) **39** with an illuminator, or may be provided by using a sound. The drug station **1** according to the first

embodiment may also use the opening and closing timing of the shutter **322** described above.

Control for Closing Shutter

[0590] As shown in FIGS. **33** and **47**, the picking unit **3**A includes the tray close buttons **39**. Each tray close button **39** may include the illuminator (e.g., a light-emitting diode, or an LED). The picking unit controller **12** illuminates the tray close button **39** to inform the user that the shutter **322** is to be closed. In this case, the illuminating tray close button **39** illuminates to inform the user of the time to close the shutter **322**.

[0591] The picking unit controller **12** disables an input operation (pressing operation) on the tray close button **39** for closing the shutter **322** received while the tray close button **39** is off. Thus, the shutter **322** remains open although the user accidentally presses the tray close button **39** while the shutter **322** is open.

[0592] During a picking operation (or during an automated dispensing operation), the picking unit controller **12** illuminates the tray close button **39** after, for example, receiving a pressing operation on all the checkboxes included in the supplementary information display area B**15** in the description screen image **24002** (refer to FIG. **24**). The picking unit controller **12** turns off the tray close button **39** when the shutter **322** is closed after receiving a pressing operation on the tray close button **39**.

[0593] During a loading operation (including a selected loading operation), for example, the picking unit controller **12** illuminates the tray close button **39** when the shutter **322** is open, and turns off the tray close button **39** when the tray close button **39** is pressed and the shutter **322** is closed.

[0594] The user performs operations while viewing such various screen images appearing on the second touchscreen **31**. During a picking operation, in particular, the user performs operations while viewing information about each drug to be removed on the second touchscreen **31**, including the quantity of each drug to be removed and supplementary information (appended information) about each drug. The user tends to concentrate on the information appearing on the second touchscreen **31**. Thus, the user may not notice that the tray close button **39** is illuminating (specifically, the tray close button **39** can be pressed) after an input operation is performed on all the checkboxes. In this case, the user may not close the shutter **322** in a timely manner when the shutter **322** can be closed. This may lower the operational efficiency.

[0595] In the present embodiment, the touchscreen controller **14** displays a guide screen image **49001** on the second touchscreen **31** as shown in FIG. **49** for prompting the user to close the shutter **322**. FIG. **49** is a diagram of an example guide screen image **49001**. For example, after an input operation on all the checkboxes has been received, the touchscreen controller **14** displays the guide screen image **49001**. The touchscreen controller **14** can thus inform the time to close the shutter **322**. Thus, the touchscreen controller **14** allows the user to press the tray close button **39** in a timely manner. This reduces the likelihood that the operational efficiency decreases during a picking operation.

Modifications of Control for Closing Shutter

[0596] The tray close button **39** may receive an input operation on each checkbox in the supplementary information display area B**15**, in addition to closing the shutter **322**. In this case, the tray close button **39** is simply pressed to enter an input operation on each checkbox appearing on the second touchscreen **31**, without separately receiving an input operation on each checkbox. The user can thus perform the input operation in a simpler manner.

[0597] For multiple checkboxes appearing on the second touchscreen **31**, for example, the user may feel troublesome to perform an input operation on each checkbox. This structure allows the user to simply press the tray close button **39** to select each checkbox.

[0598] However, in response to a pressing operation on the tray close button **39** performed the number of times exceeding the number of checkboxes appearing on the second touchscreen **31**, the picking unit controller **12** may stop entering such an input operation on the checkboxes and use the

input operation for closing the shutter **322**. In this case, the shutter **322** may be closed by the user performing a pressing operation on the tray close button **39** the number of times exceeding the number of checkboxes without intending to cause the picking unit controller **12** to close the shutter **322**. After the shutter **322** is closed, the picking unit controller **12** may transport a cassette Ca to the cassette holder **230** (in other words, may start a returning operation to the main unit **2A**). The target cassette Ca may be later to be transported from the main unit **2A** to the drug receiver **32**.

[0599] In the present embodiment, the picking unit controller **12** waits for an input operation for closing the shutter **322** after receiving an input operation on the checkboxes appearing on the second touchscreen **31** with the tray close button **39**. The picking unit controller **12** closes the shutter **322** in response to a pressing operation on the tray close button **39** after receiving an input operation for closing the shutter **322** on a portion other than the tray close button **39**. In other words, after receiving a pressing operation the number of times exceeding the number of checkboxes, the picking unit controller **12** disables such a pressing operation on the tray close button **39** until receiving an input operation for closing the shutter **322**.

[0600] The touchscreen controller **14** displays a screen image for receiving an input operation for closing the shutter **322** on the second touchscreen **31** after receiving an input operation on the checkboxes appearing on the second touchscreen **31** with the tray close button **39**. In response to an input operation performed by the user on the screen image, the picking unit controller **12** enables the function of the tray close button **39** for closing the shutter **322**.

[0601] This prevents the shutter **322** from being closed when the user presses the tray close button **39** the number of times exceeding the number of checkboxes without intending to close the shutter **322**. This thus reduces the likelihood that the operational efficiency decreases when the user unintentionally closes the shutter **322**.

[0602] Also, the user may perform an input operation on the checkboxes with the tray close button **39** without counting the number of times to press the tray close button **39**. The user can thus perform the input operation in a simpler manner.

Control for Opening Shutter for Loading Next Drug

[0603] As described in the first embodiment, the picking unit controller **12** determines whether the quantity of drug sheets specified by prescription data has been removed from a cassette Ca based on an image of the drug sheets captured by the image sensor **335** and the weight of the drug sheets measured by the measuring unit **336** (refer to FIG. **2**).

[0604] After determining that the prescribed quantity of drugs has been removed, the picking unit controller **12** enables a pressing operation for closing the shutter **322** on the tray close button **39**. In some embodiments, the picking unit controller **12** may enable the pressing operation before determining that the prescribed quantity of drugs has been removed (before the determination). In this case, the picking unit controller **12** can close the shutter **322** in response to a pressing operation on the tray close button **39** performed before the determination. The picking unit controller **12** can transport a cassette Ca from which a drug has been removed from the drug receiver **32** to the main unit **2A** and can call another cassette Ca containing a next drug (next cassette Ca) onto the drug receiver **32**. This improves the operational efficiency in the picking operation.

[0605] To perform the above determination, the picking unit controller **12** waits for the count result output from the measuring unit **336**. For the measuring unit **336** that may be a load cell, the picking unit controller **12** waits for the count result until the operation of the load cell is stabilized. To enable the pressing operation before the determination, the picking unit controller **12** can close the shutter **322** in response to a pressing operation on the tray close button **39** without waiting for the output of the count result. The picking unit controller **12** may also close the shutter **322** in response to the pressing operation without waiting for the determination result output after receiving the count result.

[0606] The user who has experienced the picking operation repeatedly may be less likely to remove an erroneous quantity of drug from a cassette Ca. Removing an erroneous quantity of drug is also

unlikely when, for example, no separate drug pieces are to be removed from a cassette Ca (when multiple drug sheets alone are to be removed from a cassette Ca) or a drug in a form other than a drug sheet with no separate drug pieces (e.g., a cream, an eyedrop, or a powdered drug) is to be removed from a cassette Ca. In this case as well, the pressing operation may be enabled before the determination performed by the picking unit controller **12**.

[0607] However, the picking unit controller **12** may determine that a drug in the prescribed quantity has not been removed from the cassette Ca. In this case, the touchscreen controller **14** displays the determination result on the second touchscreen **31**. However, the user may press the tray close button **39** without viewing the information. In this case, the picking unit controller **12** first closes the shutter **322** and then transports the cassette Ca to the main unit **2**A. More specifically, despite the determination that the drug in the prescribed quantity has not been removed from the cassette Ca, the picking unit controller **12** may return the cassette Ca on the drug receiver **32** to the main unit **2**A and may call a next cassette Ca to the drug receiver **32**.

[0608] The main unit controller **11** and the picking unit controller **12** may recall the cassette Ca returned to the main unit **2**A to the drug receiver **32** in response to an input operation performed by the user. The user can thus recall, to the drug receiver **32**, the cassette Ca containing the drug with the determination indicating that the prescribed quantity of drug has not been removed and can check whether the correct quantity of the drug has been placed on the transportation tray Tr.

[0609] For example, the picking unit controller **12** stores the above determination result with prescription data in the memory **15**. The user places the transportation tray Tr containing the drug to be determined as described above onto the tray support **38**, and reads the barcode for the drug with the barcode reader **34**. The picking unit controller **12** determines whether the drug with the barcode is the drug with the above determination based on the read barcode and the determination result stored in the memory **15**. The barcode may be replaced by other input information that can identify the drug, such as the drug name. When the drug with the barcode is determined to be the drug with the above determination, the main unit controller **11** and the picking unit controller **12** specify the cassette Ca to be recalled, and transports the cassette Ca from the main unit **2**A to the drug receiver **32**.

[0610] The pressing operation enabled before the above determination and the pressing operation enabled after the prescribed quantity of drug has been removed may be switched selectively by, for example, the user. These two capabilities may also be set in accordance with, for example, the drug type, the quantity of drug to be dispensed, or whether the drug quantity includes separate drug pieces.

Example Screen Image on First Touchscreen

[0611] An example screen image to appear on the first touchscreen **5** will now be described below. FIG. **50** is a diagram of an automated dispensing screen image **50001** as another example of the automated dispensing screen image **17001** shown in FIG. **17**. As shown in FIG. **50**, the automated dispensing screen image **50001** differs from the automated dispensing screen image **17001** in that the dispensing list display area A**20** includes a drug number field in addition to the entry number field, the patient name field, the status field, the waiting time field, and the other machine preparation field.

[0612] The drug number field displays the number of drugs of different types (different drugs) to be placed on a single transportation tray Tr. The control unit **10** calculates the number of drugs of different types based on prescription data. The drug number field allows the user to determine the number of drugs of different types to be placed on the transportation tray Tr for each patient.

[0613] At the drug station **1**A, the user replaces the transportation tray Tr on the tray support **38** with an empty transportation tray Tr when the dispensing of drugs onto the transportation tray Tr is complete. The touchscreen controller **14** displays the tray removal screen image **24003** (refer to FIG. **24**) on the second touchscreen **31** at the time when the transportation tray Tr is to be replaced. This informs the user of the time to replace the transportation tray Tr. The drug number field on the

first touchscreen **5** as well can inform the time to replace the transportation tray Tr.

[0614] Also, the user may erroneously intend to replace the transportation tray Tr receiving fewer types of drugs than to be actually placed on the transportation tray Tr. For example, the user may erroneously intend to replace the transportation tray Tr after a single type of drug is placed on the transportation tray Tr when two types of drugs are actually to be placed on the transportation tray Tr.

[0615] In this case, the second touchscreen **31** does not display the tray removal screen image **24003** at the time when the user intends to replace the transportation tray Tr. However, the user may tend not to easily notice the error although the second touchscreen **31** displays information for dispensing the next drug (the first confirmation screen image **22001** or the second confirmation screen image **22002**; refer to FIG. **22**) without displaying the tray removal screen image **24003**. The user may also determine that the first confirmation screen image **22001** or the second confirmation screen image **22002** may be appearing erroneously.

[0616] The drug number field allows the user to determine the number of drugs of different types to be placed on the transportation tray Tr. The user viewing the drug number field and the transportation tray Tr can thus more easily notice the above error. As described below, the touchscreen controller **14** may display an operation number display area B**125** on the second touchscreen **31** as shown in FIG. **51** to reduce the likelihood of the above error by the user.

Example Screen Image on Second Touchscreen

[0617] An example screen image to appear on the second touchscreen **31** will now be described. The example will be described below using the drug station **1**A, but may also be applicable to the drug station **1**.

Another Example of First Confirmation Screen Image: Displaying Operational Procedure

[0618] FIG. **51** shows first confirmation screen images **51001** and **51002** as other examples of the first confirmation screen image **22001**. The first confirmation screen image **51001** is an example screen image for uncertified users (technicians), whereas the first confirmation screen image **51002** is an example screen image for qualified users (pharmacists). Unlike the first confirmation screen image **22001**, the first confirmation screen images **51001** and **51002** in the illustrated example each include the second display area B**12** with no confirm button B**123**.

For Uncertified Users

[0619] For an uncertified user, the picking unit controller **12** displays the first confirmation screen image **51001**. The memory **15** prestores each user ID and the status of each user either as an uncertified or qualified user in a manner associated with each other. The picking unit controller **12** determines whether the user is either uncertified or qualified based on login information input by the user when using the picking unit **3**A.

[0620] The second display area B**12** included in the first confirmation screen image **51001** includes the operation number display area B**125** for displaying the number of picking operations on a single transportation tray Tr. The operation number display area B**125** displays, for example, the total number of picking operations to be performed on a single transportation tray Tr and the current number of picking operations performed on the single transportation tray Tr. More specifically, the operation number display area B**125** displays the total number of types of drugs that can be contained in a single transportation tray Tr and the number of types of drugs placed on the transportation tray Tr through the current picking operation.

[0621] In the example shown in FIG. **51**, the operation number display area B**125** displays **1/2**, which represents the number of picking operations performed on the single transportation tray Tr, out of the total number of picking operations to be performed on the single transportation tray Tr. In this case, the operation number display area B**125** indicates that the first picking operation is currently being performed, out of all the two picking operations to be performed on the single transportation tray Tr. More specifically, the operation number display area B**125** indicates that the picking operation is currently being performed for the first type of drug out of all the two types of

drugs to be placed onto the single transportation tray Tr.

[0622] This informs the user of the total number of picking operations to be performed on the single transportation tray Tr, and also the positioning of the current picking operation, out of all the picking operations to be performed. The user can thus notice the overall procedure of the picking operations on the single transportation tray Tr.

For Qualified Users

[0623] For a qualified user, the picking unit controller **12** displays the first confirmation screen image **51002**.

[0624] The second display area B**12** included in the first confirmation screen image **51002** includes a patient name display area B**126** for displaying a patient name, in addition to the operation number display area B**125**. Also, the operation number display area B**125** displays, for example, the total number of picking operations for a single recipe (Rp), and the current number of picking operations performed for the recipe. A recipe represents information indicating the type of one or more drugs, the quantity (dosage), and the dosing period (or the total dosage) defined for each dosage specifying the number of doses and the dosing times per day (corresponding to a classification allocated at the time of prescription; e.g., three times a day after every meal or twice a day after breakfast and dinner). For a single patient with multiple dosages (or recipes), each recipe has a recipe number.

[0625] In the example shown in FIG. **51**, the operation number display area B**125** displays the recipe number and Rp**1-1/2**, which represents the positioning of the current picking operation for the single recipe, out of the total number of picking operations to be performed for the single recipe. In this case, the operation number display area B**125** indicates that the first picking operation is currently being performed for the recipe number of **1** (Rp**1**), out of all the two picking operations to be performed for the single recipe. More specifically, the operation number display area B**125** indicates that the picking operation is currently being performed for the first type of drug, out of all the two types of drugs included in the single recipe with the recipe number of **1**.

[0626] For any transportation tray Tr to receive drugs per recipe number, the total number of picking operations for the single recipe is the total number of picking operations for the single transportation tray Tr and is also the total number of different types of drugs to be placed on the transportation tray Tr. Also, the positioning of the current picking operation for the single recipe is the positioning of the current picking operation on the single transportation tray Tr. This information indicates the positioning of the current drug, out of all the different types of drugs to be placed on the transportation tray Tr.

[0627] This informs the user of the total number of picking operations to be performed on the single transportation tray Tr, as well as the positioning of the current picking operation, out of all the picking operations to be performed. The user can notice the overall procedure of the picking operations on the single transportation tray Tr. However, drugs may not be placed onto each transportation tray Tr under each recipe number.

[0628] For any qualified user performing a picking operation, the patient name and the positioning of the picking operation based on each recipe as described above allow the user to check drugs to be placed onto the transportation tray Tr per recipe. This allows a picking operation to aid a final inspection that follows the picking operation.

Supplementary Information

[0629] When the first confirmation screen image **51001** or **51002** appears, the operation number display area B**125** and/or the patient name display area B**126** also appears on, for example, the second confirmation screen image **22002** and the first determination screen image **24001**. Also, the operation number display area B**125** and/or the patient name display area B**126** also appears on the background of the forced termination accept screen image **23001**, and on the third confirmation screen image **23002**, the description screen image **24002**, and the second determination screen image **25001**.

Third Determination Screen Image

[0630] FIG. **52** is a diagram of an example third determination screen image **52001** and an example third determination screen image **52002**. FIG. **52** is a diagram of example screen images for an uncertified user. The third determination screen image **52001** may include the second display area B**12** including the patient name display area B**126**, similarly to the first confirmation screen image **51002** in FIG. **51**.

[0631] The third determination screen images **52001** and **52002** each show a determination result indicating whether the prescribed number of separate drug pieces has been removed from a cassette Ca. The picking unit controller **12** obtains the determination result based on the count result obtained by analyzing the image containing the separate drug pieces captured by the image sensor **335**. The touchscreen controller **14** switches the screen image from the second confirmation screen image **22002** to the third determination screen image **52001** or **52002** on the second touchscreen **31** based on the determination result.

[0632] The third determination screen image **52001** is an example screen image appearing when the picking unit controller **12** determines that the prescribed number of separate drug pieces has been removed from the cassette Ca. The touchscreen controller **14** displays the count result on the first display area B**11** on the third determination screen image **52001**. In the example shown in FIG. **52**, the prescribed number of separate drug pieces (number of drug pieces) is 1, and the count result indicates Number of drug pieces: 1. The touchscreen controller **14** displays the circle sign image in the first display area B**11** as the determination result image indicating that the prescribed quantity of separate drug pieces has been removed from the cassette Ca. The touchscreen controller **14** further displays, in the first display area B**11**, a message associated with the next operational procedure (a message prompting the user to place the prescribed quantity of drug sheets onto the tray support **38** (scale) in the example shown in FIG. **52**).

[0633] The third determination screen image **52002** is an example screen image appearing when the picking unit controller **12** determines that the prescribed number of separate drug pieces has not been removed from the cassette Ca. The touchscreen controller **14** displays, together with the count result (Number of drug pieces: 2 in FIG. **52**), the cross sign image in the first display area B**11** on the third determination screen image **52002** as the determination result image indicating that the prescribed quantity of separate drug pieces has not been removed from the cassette Ca. The touchscreen controller **14** further displays, in the first display area B**11**, a message prompting the user to place the prescribed quantity of separate drug pieces onto the drug receptacle **37**.

[0634] In this manner, the above count result and the above determination result for the separate drug pieces also allow the user to determine whether the prescribed quantity of drugs has been removed from the cassette Ca quantitatively and intuitively.

Another Example of First Confirmation Screen Image and Description Screen Image

[0635] FIG. **53** is a diagram of a first confirmation screen image **53001** as still another example first confirmation screen image **22001**, and a description screen image **53002** as still another example description screen image **24002**. The first confirmation screen image **53001** and the description screen image **53002** shown in FIG. **53** may also display the operation number display area B**125** and/or the patient name display area B**126** and may not display the confirm button B**123** in the same manner as in FIGS. **51** and **52**.

[0636] In the second embodiment, the supplementary information display area B**15** is minimized in the first confirmation screen image **22001**. Subsequently, in response to an input operation (e.g., an upward swipe operation) in the supplementary information display area B**15** on the first determination screen image **24001**, the touchscreen controller **14** maximizes the supplementary information display area B**15** in the description screen image **24002**. The supplementary information display area B**15** may be maximized at timing other than in response to an input operation in the supplementary information display area B**15**. When the picking unit controller **12** determines that the prescribed quantity of drugs to be dispensed has been removed from the

cassette Ca, the touchscreen controller **14** may first display the circle sign image as the image determination result and then maximize the supplementary information display area B**15**.

[0637] In the present embodiment, the touchscreen controller **14** displays, selectively from all items of supplementary information appearing in the supplementary information display area B**15**, items of supplementary information that are particularly useful for the user in placing drugs onto the transportation tray Tr (useful supplementary information) on the first confirmation screen image **53001**. The touchscreen controller **14** displays useful supplementary information alone in the supplementary information display area B**15** at least until the circle sign image appears on the first confirmation screen image **53001** as the determination result. The user can notice such useful supplementary information.

[0638] Items of useful supplementary information may be specified in advance depending on the type of each drug or depending on each patient. For example, an item of supplementary information may be a notice not to split a drug sheet into a single packed drug piece. For example, a patient may mistakenly recognize a single packed drug piece as a tablet or any other unpacked drug piece, and may mistakenly swallow the drug piece without unpacking. This item of supplementary information is useful for this patient. In this manner, an item of useful supplementary information may be specified for each patient to reduce the likelihood of such an accident.

[0639] Subsequently, when the picking unit controller **12** determines that the prescribed quantity of drugs to be dispensed has been removed from the cassette Ca, the touchscreen controller **14** may display the supplementary information display area B**15** on the description screen image **24002** (refer to FIG. **24**) in a maximized manner. In response to an input operation in the supplementary information display area B**15**, the touchscreen controller **14** may maximize the supplementary information display area B**15**.

[0640] As described in the second embodiment, the touchscreen controller **14** may display the supplementary information display area B**15** in an enlarged manner to cause the confirm button B**123** to be invisible. The touchscreen controller **14** then displays the supplementary information display area B**15** in an enlarged manner to cause the confirm button B**123** to be invisible independently of the number of items of supplementary information to appear in this area. The touchscreen controller **14** may display the supplementary information display area B**15** in an enlarged manner although a small number of items of supplementary information are to appear in the area. In this case, the touchscreen controller **14** may display a blank image in the part of the supplementary information display area B**15** excluding the supplementary information to cause the confirm button B**123** to be invisible.

[0641] When, for example, the terminate button B**122** appears and the confirm button B**123** does not appear as shown in FIGS. **51** and **52**, the touchscreen controller **14** displays the supplementary information display area B**15** in an enlarged manner to cause the terminate button B**122** to be invisible.

[0642] The touchscreen controller **14** may display the description screen image **53002** instead of the description screen image **24002**. The description screen image **24002** includes checkboxes for all items of supplementary information included in the supplementary information display area B**15**. In this case, the touchscreen controller **14** cannot switch the screen image to a subsequent screen image until receiving an input operation on all the checkboxes for the items of supplementary information.

[0643] The supplementary information display area B**15** on the description screen image **53002** may have a checkbox for each item of useful supplementary information alone and may not have a checkbox for any other item of supplementary information. In this case, the touchscreen controller **14** switches the screen image to the next screen image in response to an input operation on the checkbox for each item of useful supplementary information.

[0644] The description screen image **53002** allows the user to check useful supplementary

information in a more reliable manner and allows the user to decide whether to check other supplementary information. This improves the operational efficiency in the picking operation.

Implementations Using Software

[0645] The control blocks of the control unit **10** (in particular, the components of the main unit controller **11**, the components of the picking unit controller **12**, the transporter controller **13**, and the touchscreen controller **14**) may be implemented by logic circuits (hardware) included in integrated circuits (IC chips) or may be implemented by software.

[0646] When using software for implementing each function, the control unit **10** includes a computer for executing instructions included in a software program. The computer includes, for example, one or more processors and a computer-readable recording medium storing the program. The processor in the computer reads the program from the recording media and executes the program to achieve the aspects of the present invention. The processor is, for example, a central processing unit (CPU). The recording medium may be a non-transitory tangible medium, such as a read-only memory (ROM), a tape, a disk, a card, a semiconductor memory, or a programmable logic circuit. The computer may additionally include a random-access memory (RAM) for expanding the program. The program may be provided through any transmission medium that can transmit the program to the computer (e.g., a communication network or a broadcast wave). One aspect of the present invention may be a data signal superimposed on a carrier wave representing the program through electronic transmission.

Appendix

[0647] The embodiments disclosed herein should not be construed to be restrictive, but may be modified within the spirit and scope of the claimed invention. The technical features disclosed in the embodiments may be combined in other embodiments within the technical scope of the invention.

Claims

1. (canceled)

2. A cassette handling apparatus for transporting and receiving a cassette to and from a drug handling apparatus, the drug handling apparatus including a drug receiver for removing a drug from a cassette or loading a drug into the cassette, the cassette handling apparatus comprising: a cassette shelf configured to store a plurality of cassettes; two or more transporting cassette holders configured to be capable of temporarily holding a plurality of cassettes removed from the cassette shelf and to be transported to the drug receiver; two or more returning cassette holders configured to be capable of temporarily holding the plurality of cassettes received from the drug receiver and to be returned to the cassette shelf; and a cassette transporter configured to transport the cassette between the cassette shelf and the two or more transporting cassette holders, and between the cassette shelf and the two or more returning cassette holders.

3. The cassette handling apparatus according to claim 2, wherein each of the two or more transporting cassette holders and the two or more returning cassette holders is a receptacle configured to receive the cassette, and the receptacle operates in a switchable manner to be the two or more transporting cassette holders or to be the two or more returning cassette holders.

4. The cassette handling apparatus according to claim 2, wherein the two or more transporting cassette holders comprises a plurality of transporting cassette holders for the drug receiver, and the two or more returning cassette holders comprises a plurality of returning cassette holders for the drug receiver.

5. The cassette handling apparatus claim 2, wherein the cassette shelf stores the plurality of cassettes in a matrix, and the cassette transporter draws a cassette from the cassette shelf and then places the cassette onto the two or more transporting cassette holders, and draws the cassette placed on the two or more returning cassette holders and then returns the cassette to the cassette shelf.

6. The cassette handling apparatus according to claim 2, wherein the cassette shelf includes a first cassette shelf configured to store a plurality of cassettes along a first vertical plane, and a second cassette shelf configured to store a plurality of cassettes along a second vertical plane different from the first vertical plane the cassette transporter includes a cassette gripper configured to draw a cassette from the cassette shelf or from the two or more returning cassette holders and grip the drawn cassette, and the cassette gripper rotates about a rotation axis extending vertically to be movable toward the first cassette shelf or toward the second cassette shelf, and then draws a cassette from the first cassette shelf or from the second cassette shelf.

7. The cassette handling apparatus according to claim 2, wherein the cassette transporter includes a plurality of cassette grippers each configured to draw a cassette from the cassette shelf or from the two or more returning cassette holders and grip the drawn cassette, and the plurality of cassette grippers are movable without hitting one another.

8. The cassette handling apparatus according to claim 2, wherein the cassette transporter transports, based on prescription data associated with administration to a patient, a cassette containing a drug indicated by the prescription data to the two or more transporting cassette holders.