

DESCRIPTION

[Title of the Invention] MULTIFUNCTIONAL SHIP SYSTEM

[Technical Field]

5 [0001]

The present invention relates to a multifunctional ship system having a medical care function in the case of an emergency to transport health professionals to a disaster area by the ship and offer medical treatment to people in need of relief and a medicine storage ship function to store prescription medicines prescribed in accordance with the medical
10 care function.

[Background]

[0002]

To forestall disasters associated with global climate change in recent years, limits on emission of carbon dioxide have been actively discussed internationally by the United
15 Nations and the like.

[0003]

For example, the Cabinet Office of Japan has been discussing a hospital ship conception to quickly offer medical treatment to sufferers from large-scale natural disasters such as earthquakes, floods, debris flows, and pyroclastic flows accompanying
20 volcanic eruptions.

[0004]

For example, at the time of the Great Hanshin Earthquake, it is still fresh in our memory that a massive earthquake occurred before dawn destroyed large buildings, fires started at

the same time in different places, and thousands of precious lives were lost.

In that area, it has been concluded that a factor in the increase in the number of victims is that the blockage of traffic by land routes in various places paralyzed firefighting and lifesaving.

5 [0005]

The Cabinet Office have therefore been discussing construction of several new hospital ships using sea routes without using land routes and use of the 5G communications network to support quick rescue and relief activities.

10 A free encyclopedia discloses the activity of a hospital ship having a displacement of 9,800 tons called Mercy (AH-8) operated by the United States Navy in the United States.
[0006]

To provide a relief ship (such as a hospital ship) dispatched to a coastal disaster area or the like that can improve the communication situation in the disaster area or the like, Patent Literature 1 below discloses a relief ship including a hull; an on-board relay station
15 mounted on the hull to create a first wireless communication area on and/or around the hull; at least one mover mounted on the hull and movable to an arbitrary place away from the hull; and a mobile relay station mounted on the mover, in which the on-board relay station is configured to receive a radio wave transmitted from a ground base station and transmit the radio wave to a wireless terminal located in the first wireless communication
20 area and configured to receive a radio wave transmitted from the wireless terminal located in the first wireless communication area and transmit the radio wave to the ground base station, and the mobile relay station is configured to relay radio waves between the on-board relay station and the ground base station.

[Citation List]

[Patent Literature]

[0007]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2021-

5 172179

[Summary of the Invention]

[Technical Problem]

[0008]

At present, in the Seto Inland Sea where there are many “doctorless islands” without
10 resident doctors, a hospital ship named “Saiseimaru” operates as a traveling clinic ship.

[0009]

Medical examinations by the Saiseimaru cover as various diseases as a general hospital
such as chest diseases, digestive diseases, circulatory system diseases, gynecological
diseases, and surgical diseases. Saiseimaru offers medical care of ophthalmology,
15 otolaryngology, plastic surgery, and dermatology as designated clinical departments and
also offers pediatric care as general health examinations.

The traveling medical care service by Saiseimaru functions as, so to speak, a general
hospital on a ship and provides important medical services to inhabitants of isolated
islands in the Seto Inland Sea.

20 However, at the time of an emergency of a disaster, the scale of the health professionals
on Saiseimaru is not enough to quickly deal with thousands of people to be relieved.

[0010]

At the time of such an emergency, provision of only medicines required for medical

care of hundreds of people is not nearly sufficient for providing an environment where medicines can be prescribed for people in need of relief at the time of a disaster affecting thousands of people.

[0011]

5 Plans of enhancing health professionals and medical devices have been proceeding through the discussion on hospital ships by the Cabinet Office, but permanent provision of the medicine storage ship function to hospital ships to provide sufficient medicines to a large number of sufferers has not been sufficiently discussed.

[0012]

10 The present invention has been made to solve the above problems, and an object of the present invention is to provide a multifunctional ship system having a medicine storage ship function that enables storing of medicines of a proper amount and proper quality in case of an emergency to enhance the medical service function of a hospital ship and to prevent paralysis of a medicine prescription function of the medical service function.

15 [Solution to Problem]

[0013]

A multifunctional ship system of the present invention for achieving the object has the following configuration.

[0014]

20 A multifunctional ship system according to the present invention includes a ship control system configured to control navigation of a multifunctional ship having both a medical ship function and a storage ship function; a hospital ship system including a device configured to offer a predetermined medical service in the multifunctional ship; a

warehouse management system configured to store a location of a medicine stored in a medicine warehouse in the multifunctional ship and to control intake or dispatch of the medicine; and an emergency information system configured to indicate maneuver for the multifunctional ship, the ship control system, the hospital ship system, the warehouse management system, and the emergency information system being configured to communicate with each other to allow the medical ship function and the storage ship function to complementarily function.

[Advantageous Effects of Invention]

[0015]

10 The present invention provides a multifunctional ship system that can enhance the function as a hospital ship, quickly deliver required medicines to health professionals offering relief and medical treatment in an actual place, provide sufferers with appropriate medical services, and stock a sufficient amount of medicines in a multifunctional ship for prescription by the health professionals for patients in a disaster area where the hospital
15 ship calls at the time of a disaster.

[Brief Description of Drawings]

[0016]

The drawings illustrate specific embodiments of the present invention including optional and preferred embodiments as well as essential features of the invention.

20 Fig. 1(a) is a configuration block diagram of a multifunctional ship system, and Fig. 1(b) shows an example of the arrangement of mooring points for multifunctional ships.

Fig. 2 illustrates the configuration of the multifunctional ship shown in Fig. 1.

Fig. 3 is a block diagram illustrating the configuration of the multifunctional ship system

of the present embodiment.

Fig. 4 is a perspective view for illustrating the structure of a medicine cart shown in Fig. 3.

Fig. 5 is a block diagram illustrating a control system for the medicine cart shown in Fig. 4.

Fig. 6 is a perspective view for illustrating the structures of a first medicine warehouse, a second medicine warehouse, and a third medicine warehouse shown in Fig. 2.

Fig. 7 is a perspective view of an example of a medicine collecting robot shown in Fig. 6.

Fig. 8 illustrates a table for managing cooperating multifunctional ships in the multifunctional ship system of the present embodiment.

Fig. 9 shows an example of a medicine management table managed by an emergency information system shown in Fig. 1.

[Description of Embodiment]

[0017]

The best mode for carrying out the present invention will be described with reference to the drawings.

The drawings illustrate specific embodiments of the present invention including optional and preferred embodiments as well as essential features of the invention.

[0018]

<Description of System Configuration>

[First Embodiment]

The best mode for carrying out the present invention will be described with reference

to the drawings.

Fig. 1 is a block diagram illustrating the configuration of a multifunctional ship system of the present embodiment. The present system is characterized by, in a multifunctional ship having both a medical ship function and a storage ship function, a multifunctional ship system in which a ship control system 202 configured to control navigation of the multifunctional ship communicates with a hospital ship system 206 configured to offer a medical service and a warehouse management system 201 configured to store a location of a medicine stored in a medicine warehouse in the multifunctional ship and to control entering or dispatching of the medicine via a predetermined communication medium to allow the medical ship function and the storage ship function to complementarily function.

[0019]

The multifunctional ship is built to have a displacement of a large ship or a medium-sized ship depending on the scales of the function as a medical ship and the function as a medicine warehouse, and the number of medical beds varies depending on the number of permanent medical care staffs of health professionals and the possibility of advanced medical care of medical devices.

[0020]

The present multifunctional ship has both of the medical ship function in which a plurality of medical workspaces secured in accordance with a plurality of traffic flows secured in the ship are constructed in a multistory structure and in which medical devices adapted to the medical care classification, medical diagnostic devices, and examining tables are arranged in each medical workspace to offer medical services to people in need

of relief and the storage ship function to store a location of a medicine stored in a medicine warehouse in the multifunctional ship and to receive or dispatch the medicine. The multifunctional ship serves as a medical ship at ordinary times and as a storage ship for transporting medicines at the time of emergency disaster to support medical care and
5 medicine prescription operations by calling at a port near the disaster area where the disaster has occurred. In addition to the above storage function of a stockpile of medicines for emergency (a storage ship transporting medicines at the time of emergency disaster), any story in the warehouse function in a hierarchical layout may also function as a medicine warehouse in peacetime. In this case, the lineup of medicines and
10 chemicals to be stored in the warehouse is peculiar to surgery, internal medicine, orthopedic surgery, heart surgery, brain surgery, pediatrics, obstetrics and gynecology, dermatology, and emergency medical care, and the assortment should be determined by a conference of expert health professionals of the respective departments.

[0021]

15 Accordingly, the multifunctional ship system of the present embodiment has an automated transportation route network and exclusive elevators for transportation in the ship as the storage ship function for transporting medicines in order to automate the entering (carrying in) and dispatching (carrying out) of medicines using a transportation unit (medicine cart to be described later) containing stocked medicines.

20 Further, the transportation unit includes a camera and an obstacle sensor to enable the automated transportation function to move in the longitudinal direction or the transverse direction on the automated transportation route network.

[0022]

The multifunctional ship system having the present function can be simultaneously moored at a plurality of base ports, but the candidates for calling of each multifunctional ship are limited by the decision of the headquarters in the official residence according to the size of the multifunctional ship.

5 [0023]

At the time of an emergency, the ship leaves a port at which the ship has been moored on the basis of a candidate hospital on land to which people in need of relief are taken and moves to the port nearest to the disaster area so as to enable quick medical support activities and preferential transportation of medicines to a designated hub general hospital
10 or the like for disaster to which transportation by land routes is difficult.

[0024]

In the case where it is estimated that one multifunctional ship cannot provide sufficient medicines when the disaster has occurred, it is also possible that medicines collected by land routes and stored in a warehouse near a port are transported by shuttle transportation
15 to a port near the disaster area using multifunctional ships calling at the port using a fleet of multifunctional ships.

[0025]

Fig. 1 illustrates the configuration of the multifunctional ship system of the present embodiment and an example of the arrangement of multifunctional ships. Fig. 1(a) is a
20 configuration block diagram of the multifunctional ship system, and Fig. 1(b) shows the example of the arrangement of mooring points for the multifunctional ships.

[0026]

In Fig. 1(a), the reference sign 1 denotes a multifunctional ship group (fleet) that is

constituted of multifunctional ships 1-1 to 1-N in this example. The number of multifunctional ships 1-1 to 1-N ($N = 7$ in the present embodiment) is not limited to 7 and increases or decreases according to the sizes of the multifunctional ships.

[0027]

5 Specifically, as shown in Fig. 1(b), the multifunctional ship 1-1 is in charge of a Kyushu district PA and is moored at designated mooring ports in Nagasaki and Saga. The multifunctional ship 1-1 is selected by a subcommittee or the like participating in an emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0028]

10 The multifunctional ship 1-2 is in charge of a San'in bayside district PF and is moored at a designated mooring port in Ube in Yamaguchi Prefecture. The multifunctional ship 1-2 is selected by a subcommittee or the like participating in the emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

The emergency information system 2 is constituted of an emergency information
15 system communication unit 21 and conference room terminals 22-1 to 22-N.

[0029]

The multifunctional ship 1-3 is in charge of a Japan Sea bayside district PE and is moored at a designated mooring port in Tsuruga in Fukui Prefecture. The multifunctional ship 1-3 is selected by a subcommittee or the like participating in the
20 emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0030]

The multifunctional ship 1-4 is in charge of a Hokkaido bayside district PG and is moored at a designated mooring port in Tomakomai in Hokkaido. The multifunctional

ship 1-4 is selected by a subcommittee or the like participating in the emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0031]

5 The multifunctional ship 1-5 is in charge of a Tohoku bayside district PD and is moored at a designated mooring port in Sendai in Miyagi Prefecture. The multifunctional ship 1-5 is selected by a subcommittee or the like participating in the emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0032]

10 The multifunctional ship 1-6 is in charge of a Kanto bayside district PC and is moored at a designated mooring port in Takebashi in Tokyo Metropolis. The multifunctional ship 1-6 is selected by a subcommittee or the like participating in the emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0033]

15 The multifunctional ship 1-7 is in charge of a Tokai bayside district PB and is moored at a designated mooring port in Nagoya in Aichi Prefecture. The multifunctional ship 1-7 is selected by a subcommittee or the like participating in the emergency information system 2 administered by the Cabinet Office shown in Fig. 1(a).

[0034]

20 The emergency information system 2 is constructed inside the official residence. The emergency information system communication unit 21 receives a disaster relief order via each of the conference room terminals 22-1 to 22-N, and an administrative communication department 3 under the jurisdiction of the Ministry of Internal Affairs and Communications directs the multifunctional ships 1-1 to 1-7 moored or anchored at

designated ports in Japan to perform rescue operations and medicine transportation activities under the law related to disaster relief. The administrative communication department 3 is under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism and the Ministry of Health, Labour and Welfare and integrally manages the communication status through the information network for a state of emergency.

[0035]

Fig. 2 illustrates the configuration of the multifunctional ships 1-1 to 1-7 shown in Fig. 1. In this example, the nationality of the ship is Japan as indicated by a national flag 55. The multifunctional ship 1-1 will be described below as an example.

[0036]

In Fig. 2, the reference sign 51 denotes a multifunctional ship that desirably has a gross tonnage of, for example, 10,000 t or more and accommodates about 600 to 1,000 people including health professionals and patients.

[0037]

The reference sign 52 denotes a fuel room that supplies **C fuel oil** to an engine unit installed in a machine room 53 to allow continuous navigation of the multifunctional ship 1-1 over a wide area. The reference sign 54 denotes a propeller configured to enable propulsion at a predetermined speed, such as 22.7 knots, by transferring torque supplied from the machine room 53.

[0038]

The reference sign 56 denotes a crane that lifts a plurality of medicine carts for containing medicines transported by land to a pier of a port of call from the land side and moves the medicine carts to the front of the gate of a second elevator 72 on the receipt

floor (receipt deck), and the medicine carts are loaded on the second elevator 72 by a deckhand and transferred to a designated warehouse floor.

[0039]

5 The second elevator (EL) 72 is constituted of an elevator group consisting of, for example, four elevators corresponding to respective gates S1 to S4 to be described later for a first medicine warehouse 85 to a third medicine warehouse 83 on the respective floors secured as medicine warehouses.

The story near the deck includes a medicine storeroom 81 storing permanent stores and a dining room 82 for health professionals and the like.

10 [0040]

The reference sign 71 denotes a first elevator constituted of an elevator group, for example, consisting of four elevators that transports health professionals between the floors to diagnosis laboratory 64, a third sick bay 63, a second sick bay 62, and a first sick bay 61 functioning as the hospital ship.

15 [0041]

The diagnosis laboratory 64 contains a medical device for taking an X ray of a patient examined in the third sick bay 63, the second sick bay 62, or the first sick bay 61 and a laboratory equipped with testing equipment.

[0042]

20 The third sick bay 63, the second sick bay 62, and the first sick bay 61 are configured to include an operating room and, for example, 50 nursing beds used for temporarily taking care of patients in each floor as shown in the drawing.

[0043]

The reference sign 57 denotes a bridge where the captain and a plurality of navigation officers work and a GPS navigation system and various communications equipment (including a hot line with the official residence) not shown in the drawing are arranged. The reference sign 58 denotes a blade antenna configured to, for example, communicate
5 with neighboring health professionals and medical supply transporters in 5G. The reference sign 59 denotes a marine radar that performs navigation and communication for identifying the present position on a marine chart.

[0044]

The reference sign 60 denotes a heliport where a transportation helicopter 65 that
10 transports medicines and a medical helicopter with a doctor aboard (not shown) that transports people in need of relief can freely take off and land.

As means for transferring a patient between two multifunctional ships by ship-to-ship transfer, a special lifter function that enables loading/unloading of the patient from another ship may be provided.

15 [0045]

Fig. 3 is a block diagram illustrating the configuration of the multifunctional ship system of the present embodiment. The same units as in Fig. 2 are denoted by the same reference signs, and the description of the units are omitted.

[0046]

20 In Fig. 3, the reference sign 200 denotes a multifunctional ship system constituted of the hospital ship system 206 that offers medical services, the ship control system 202 that controls the navigation of the multifunctional ship and the crane 56 and the like, and the warehouse management system 201 including an entering-dispatching status storage unit

210 that stores information on medicines stocked in the warehouse, and the multifunctional ship system may be configured to enhance the function of the hospital ship system 206.

[0047]

5 The hospital ship system 206 includes a controller C1 to totally manage electric power, communications, electronic medical records, and the like in the diagnosis laboratory 64, the third sick bay 63, the second sick bay 62, and the first sick bay 61 shown in Fig. 2. The controller C1 is driven by electric power supplied from a power source 203, controls electric power supplied to medical devices used for various operations in the operating
10 rooms, and performs control of registering electronic medical records in a storage unit that manages the electronic medical records and retrieving electronic medical records stored in the storage unit.

[0048]

The reference sign 204 denotes an elevator controller that is supplied with electric
15 power from the power source 203 and controls the upward/downward transportation movement of transportation cages of the first elevator (EL) 1 and the second elevator (EL) 2 shown in Fig. 2.

[0049]

The entering-dispatching status storage unit 210 stores entering and dispatching
20 information of the medicines kept in the medicine carts 101-1 to 101-N containing the medicines to be described later. A controller C2 can retrieve the information, classification, quantity, preservation period, location information (identification code indicating where in the warehouse the medicines are stored), and the like of the medicines

written on memory chips included in the medicine carts 101-1 to 101-N and stored in the entering-dispatching status storage unit 210.

[0050]

The reference sign 211 denotes counting means that counts the quantities of medicines stored in the warehouse of the multifunctional ship by each medicine periodically or at a devastating disaster, upon receipt of instructions from the official residence, and a communication unit 251 can notify the emergency information system 2 (on the official residence side) of a guideline to specify a multifunctional ship that can sail to the disaster area via the emergency information system communication unit 21.

The controller C1 of the hospital ship system 206 is configured to be able to communicate with other multifunctional ships and share the latest medicine equipment information acquired.

[0051]

Transportation control means 212 acquires the actual locations of the medicine carts 101-1 to 101-N and controls the transportation status of the self-propelled medicine carts 101-1 to 101-N to totally control transportation status of medicine carts for entering and medicine carts for dispatching.

[0052]

The controller C2 can control a first communication unit 213 to communicate with communication units of the medicine carts 101-1 to 101-N moving in the warehouse via wireless LAN and identify the respective medicine carts 101-1 to 101-N.

[0053]

The controller C2 can communicate with the communication units of the medicine carts

101-1 to 101-N and read information in memory chips included in the medicine carts 101-1 to 101-N to retrieve the classifications and quantities of medicines presently stored.

[0054]

5 The controller C2 can control via a second communication unit 214 the movement of a medicine collecting robot 300 moving along a predetermined route in the warehouse to take out medicines stored in the medicine carts 101-1 to 101-N in units of small lots and transfer a designated medicine to a medical elevator box (not shown).

[0055]

10 The controller C2 can control via the second communication unit 214 the movement of the medicine collecting robot 300 moving along a predetermined route in the warehouse to take out a regular medicine stored in the medicine storeroom 81 in the warehouse shown in Fig. 2 and then transfer a designated medicine using any of the elevators.

[0056]

15 The ship control system 202 includes the communication unit 251, a bridge controller 252, a crane controller 253, an engine unit 254, and a power generator 255 and totally controls maneuver, electric power, and power devices of the multifunctional ship.

[0057]

20 The communication unit 251 performs wireless communication via the blade antenna 58 with the outside, such as the administrative communication department 3. The bridge controller 252 controls the crane 56, the engine unit 254, and the power generator 255 installed in the multifunctional ship to control the drive of the engine installed in the machine room 53 and supply adequate electric power to the power source 203.

The controller C1 of the hospital ship system 206 has a function to communicate with the emergency information system 2 via the communication unit 251 and notify the emergency information system 2 of the latest medicine equipment information (such as the classification, the number of tablets, and the number of bags) stocked in the warehouse
5 periodically or at any time when called.

Accordingly, the emergency information system 2 can acquire the latest medicine equipment information stocked in a plurality of multifunctional ships deployed inshore from each multifunctional ship system and give instructions to dispose and replenish medicines for which expiration dates are specified. Further, the emergency information
10 system 2 can give instruction at the time of an emergency to replace medicines in any of the multifunctional ships with specific medicines and to quickly transport a sufficient amount of required medicines by sea to the disaster area.

The emergency information system 2 can also instruct the multifunctional ship to carry out an emergency departure designated for addressing an infectious disease of foreign
15 origin as measures against the source of infection in Japan.

[0058]

The warehouse management system 201 is constituted of the entering-dispatching status storage unit 210, the counting means 211, the controller C2, the transportation control means 212, the first communication unit 213, and the second communication unit
20 214. The controller C2 controls a making function to receive medicine information sent from a transmitting unit and make a location map of the medicine carts 101-1 to 101-N carried in the multifunctional ship and a display function to display the resulting location map on a display unit (not shown). Further, the controller C2 controls a first instruction

function that communicates with the medicine carts 101-1 to 101-N to identify the actual locations and instructs the medicine carts to change the arrangement.

The controller C2 also communicates with the medicine collecting robot 300 that collects a predetermined medicine in units of lots from any of the medicine carts and
5 controls a second instruction function to instruct the medicine collecting robot 300 to transport the medicine taken out in units of lots to a replenishment port led to a receipt port of each medical workspace.

[0059]

The entering-dispatching status storage unit 210 stores in an updatable manner the
10 classifications, the levels, the remaining numbers, and the expiration dates of medicines contained in the medicine carts 101-1 to 101-N for entering or dispatching.

[0060]

The counting means 211 counts the remaining number of medicines contained in the medicine carts 101-1 to 101-N arranged in the first medicine warehouse 85, the second
15 medicine warehouse 84, and the third medicine warehouse 83 by each classification, level, and expiration date and notifies the controller C2 of the updated amount of stock of the medicines.

[0061]

The controller C2 stores the updated medicine stock counted by the counting means
20 211 on an external storage device (not shown) and notifies the administrative communication department 3 of the updated medicine stock when a periodic report from the administrative communication department 3 or an emergency report at the time of an emergency is received.

[0062]

The transportation control means 212 monitors the actual locations, moving locations, and moving status of the medicine carts 101-1 to 101-N in communication with the medicine carts 101-1 to 101-N and performs instructions on entering to a designated storage location and dispatching from a designated storage location , thereby controlling
5 linear moving, rotational moving, stopping, locking, and unlocking of the medicine carts 101-1 to 101-N with no manual intervention.

[0063]

The medicine carts 101-1 to 101-N having wheels for self-propelling on the floor is
10 configured to be able to move linearly forward or backward, and move forward or backward in the left or right direction by independently rotating front wheels and rear wheels at predetermined angles.

[0064]

Accordingly, the medicine carts 101-1 to 101-N are movable between the floors in the
15 first medicine warehouse 85, the second medicine warehouse 84, and the third medicine warehouse 83 in accordance with instructions from the transportation control means 212, and stopping and parking (locked state) modes are possible in the medicine carts 101-1 to 101-N.

The storage locations of stored medicines can thus be freely exchanged or rearranged
20 between the first medicine warehouse 85, the second medicine warehouse 84, and the third medicine warehouse 83.

[0065]

The second communication unit 214 notifies the medicine collecting robot 300 of

instructions on moving, stopping and driving control of a manipulator (arm mechanism (including fingertips)) in accordance with an instruction from the controller C2.

[0066]

Therefore, the medicine collecting robot 300 can freely move in the first medicine
5 warehouse 85, the second medicine warehouse 84, and the third medicine warehouse 83,
identify any of the medicine carts 101-1 to 101-N to collect a designated medicine in a
designated small lot.

[0067]

In the multifunctional ship system configured as described above, devices for offering
10 medical services include medical devices adapted to medical care classification, medical
diagnostic devices, and examining tables, and the warehouse management system 201
includes the entering-dispatching status storage unit 210 that stores the entering status or
dispatching status of regular medicines prescribed on the basis of the medical care
classification and medicines for emergency to be prescribed for disaster relief, the
15 counting means 211 that counts the stock of the regular medicines and the stock of the
medicines for emergency stored in the entering-dispatching status storage unit 210 with
a link to the storage location, and the controller C2 that notifies the emergency
information system 2 of the medicine information counted by the counting means 211.

[0068]

20 The multifunctional ship system shown in Fig. 3 includes the medicine carts 101-1 to
101-N that contain received medicines and the transportation control means 212 that
controls automatic carrying of the medicine carts 101-1 to 101-N into storage boxes
arranged in the ship or automatic carrying out of the storage boxes to the outside of the

ship.

[0069]

In addition, the medicine carts 101-1 to 101-N each include a controller 500 (see Fig. 5) that achieves self-propelling on transportation routes arranged for the storage boxes in accordance with the transportation route information received and stopping at a designated location.

The storage boxes correspond to designated zones (carrying-in boxes) of locker units R1 to R4.

[0070]

Further, the transportation control means 212 communicates with the controllers 500 in the medicine carts 101-1 to 101-N in accordance with storage location information received to perform control of determining the transportation direction of the medicine carts 101-1 to 101-N while retrieving identification information provided in each layer of the ship.

[0071]

Also, the feature of the transportation control means 212 is to control the medicine carts 101-1 to 101-N to be carried in from the uppermost deck of the multifunctional ship in the bottom direction of the ship via the second elevator 72 when the medicine carts 101-1 to 101-N are carried in the ship,

[0072]

Fig. 4 is a perspective view for illustrating the structure of the medicine carts 101-1 to 101-N shown in Fig. 3.

[0073]

In Fig. 4, the reference sign 401 denotes a cart body, and inner boxes 404-1 to 404-6 are configured to be drawable out from the front side. The reference signs 402-1, 402-2, 403-1, and 403-2 denote wheels that are driven by electric motors described below to enable self-propelling in the forward direction, the backward direction, and the diagonal
 5 directions. The reference sign 403-1 is not shown because the drawing is a perspective view.

The reference sign 406 denotes an RF tag that stores information for identifying the medicine carts 101-1 to 101-N. The reference sign 407 denotes an antenna that communicates with the second communication unit 214.

10 The present embodiment will describe an example to identify the medicine carts 101-1 to 101-N, but may be configured to attach the RF tag each to individual box (each package with PTP sheet contained) of the medicines contained in the medicine carts 101-1 to 101-N and enable a stock control each by individual box.

Accordingly, both cases are available, i.e. where medicines are transferred by
 15 individual boxes and where medicine units are transferred by medicine carts.

[0074]

Fig. 5 is a block diagram illustrating a control system for the medicine carts 101-1 to 101-N shown in Fig. 4.

[0075]

20 In Fig. 5, the reference sign 500 denotes a controller, and a memory chip 501 constituted of a PROM, a CPU 502, a communication unit 503, a rechargeable battery unit 504, an electric motor 505, a lock mechanism 506, a power supply plug 507, and a mover 508 are included. The controller 500 also functions as a travel controller and

retrieves identification information provided in each layer of the ship to determine the transportation direction of the medicine carts 101-1 to 101-N in accordance with storage location information received from the transportation control means 212.

[0076]

5 In the present embodiment the mover 508 shown is configured to include the four wheels 402-1, 402-2, 403-1, and 403-2 and transmit the torque from the electric motor 505 via gears (not shown), but the mover 508 and the medicine carts 101-1 to 101-N can be configured to be separable so that the cart itself does not have the smart communication function.

10 [0077]

In the case where the mover 508 and the medicine carts 101-1 to 101-N are configured to be separable, the controller 500, the ROM 501, the CPU 502, the communication unit 503, the rechargeable battery unit 504, the electric motor 505, the lock mechanism 506, and the power supply plug 507 are consolidated in the mover 508.

15 [0078]

The cost of the medicine carts 101-1 to 101-N can thus be greatly reduced.

[0079]

Fig. 6 is a perspective view for illustrating the structures of the first medicine warehouse 85, the second medicine warehouse 84, and the third medicine warehouse 83 shown in Fig. 2. The present example illustrates the first medicine warehouse 85, and descriptions of the second medicine warehouse 84 and the third medicine warehouse 83 are omitted.

[0080]

In Fig. 6, the gates S1 to S4 leading to the first medicine warehouse 85 are allocated to the four second elevators (denoted by EL2 in the drawing) 72, and the medicine carts 101-1 to 101-N are carried in or out of designated zones (carry-in boxes) of the arranged locker units R1 to R4 by automatic entering- dispatching control. Two medicine collecting robots 300 in working are shown. The reference signs M1 to M4 denote gates of the first elevators (denoted by EL1 in the drawing) 71.

[0081]

The medicine carts 101-1 to 101-N can read marks on the floor of the first medicine warehouse 85 and are configured to travel along the route indicated by the dot-dash line and be put in the carry-in space BOX of the designated locker units R1 to R4.

[0082]

In addition, the medicine carts 101-1 to 101-N shown in Fig. 6 are put in the carry-in space BOX by a separable type transportation robot S-ROB, and then the separable type transportation robot S-ROB separated from the medicine carts 101-1 to 101-N returns in the elevator and goes under the bottom of a medicine cart standing by for transportation to automatically place the medicine cart on a rack in such a way as to lift it..

[0083]

The separable type transportation robot S-ROB is provided with a lifter on the rack side, and by moving the lifter upward or downward, can put the transported medicine cart in the carry-in space BOX such that the medicine cart is supported by a guide set on the carry-in space BOX side.

[0084]

Fig. 7 is a perspective view of an example of the medicine collecting robot shown in

Fig. 6.

[0085]

In Fig. 7, the reference sign 300 denotes the medicine collecting robot provided with a communication antenna, a controller unit, a battery, an electric motor, and four wheels
5 305-1 to 305-4 (the wheel 305-4 is not shown).

[0086]

The reference signs 301 and 302 denote manipulators (an example in which an arm mechanism and finger mechanism 303, 304 are integrated.) that grab a hook for drawing set in a medicine cart with the finger mechanism 303, 304 to pick up designated medicines
10 in units of lots, and draw drawer trays T1 and T2 as shown in Fig. 6 to put the medicines in the drawer trays T1 and T2, and the medicines are delivered to designated carry-in space BOX using the first elevator 71 or the second elevator 72.

[0087]

Further, the medicine collecting robot 300 includes a camera 310, a microphone 311,
15 and a speaker 312 and is configured to be able to send an image captured by the camera 310 to the controller C2 side and utter a predetermined message from the speaker 312 on the basis of voice data received from the controller C2 by communicating with the controller C2 via the second communication unit 214.

[0088]

20 In particular, in the case where a worker and the medicine collecting robot 300 work in the same warehouse, it is configured such that mutual conversation is possible via the microphone 311 between a worker monitoring on the warehouse management system 201 side via the medicine collecting robot 300 and a health professional.

[0089]

Fig. 8 illustrates a table for managing interconnected multifunctional ships in the multifunctional ship system of the present embodiment.

[0090]

5 In the present example, the emergency information system 2 collects the updated medicine stock information stored in the entering-dispatching status storage unit 210 of each of the multifunctional ships 1-1 to 1-7 and registers the information in a memory unit (an external storage device including a hard disk or an SSD) constituting the emergency information system 2 to manage the information.

10 [0091]

The emergency information system 2 displays this management table on a display device (not shown) to be referable, so that the latest locations (based on GPS information) of the multifunctional ships moored or anchored at the area of sea around Japan at present, the stock information, classification codes, and cooperating ship IDs are available to a
15 person in charge in the Cabinet Office for checking at any time.

[0092]

The stock information is ranked into levels L1 to L5 so as to clearly distinguish and manage dangerous medicines (medicines and chemicals that require careful handling, such as morphine and vancomycin) in order to supply medicines specialized in disaster
20 types. The classification codes will be described in detail referring to Fig. 9.

[0093]

The multifunctional ships moored or anchored at the area of sea around Japan and deployed at present thus can be managed in an integrated manner, and at the time of a

large-scale disaster that cannot be addressed by one ship, medicines can be quickly provided by assigning interconnected actions to multifunctional ships in advance.

[0094]

Fig. 9 shows an example of a medicine management table managed by the emergency information system 2 shown in Fig. 1. In the present example, the emergency information system 2 collects the updated medicine stock information stored in the entering-dispatching status storage unit 210 of each of the multifunctional ships 1-1 to 1-7 and registers the information in a memory unit (an external storage device including a hard disk or an SSD) constituting the emergency information system 2 to manage the information. Medicines are classified into tablets indicated by a classification code A and bags (including blood and intravenous drip) indicated by a classification code B and divided into multifunctional ship identification codes S-ID1 to S-ID7, and the stock is managed by the number of tablets and bags. However, the management information is not limited to this manner. When there is a requirement by Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices, the standard should be met.

[0095]

[Effects of First Embodiment]

In the present embodiment, a hospital ship function is enhanced to quickly deliver required medicines to health professionals working for on-site medical relief, provide sufferers with appropriate medical services, and stock a sufficient amount of medicines in a multifunctional ship to be prescribed for patients by the health professionals in a disaster area where the hospital ship calls at the time of a disaster.

[0096]

[Second Embodiment]

In the above embodiment, an example in which stocked medicines enter in the warehouse using the second elevator 72 has been described, but the configuration may be
5 such that the transportation control means 212 controls so as to open a rear door of the medical ship and carry in the medicine carts 101-1 to 101-N from the quay side in the bottom direction of the ship when the medicine carts 101-1 to 101-N are carried in the ship.

[0097]

10 [Effects of Second Embodiment]

In the present embodiment, a medicine transportation vehicle can be driven on the deck without using a crane and the medicine carts 101-1 to 101-N can be carried in the ship while adapting to the structure of the port where the multifunctional ship approaches.

[0098]

15 [Third Embodiment]

The above embodiments have not referred to the configuration of each layer in detail, but the inside of the multifunctional ship may be constituted of a plurality of stories any of which is provided with a transportation network formed of a planar transport route on which the medicine carts 101-1 to 101-N move in the longitudinal direction or the
20 transverse direction and an elevation transport route on which the medicine carts 101-1 to 101-N move in the up-down direction from the deck.

[0099]

[Effects of Third Embodiment]

In the present embodiment, the medicine carts 101-1 to 101-N can be carried in so as to adapt to the shape of boxes (stackable boxes) of the warehouse by transporting in a planar or elevated manner.

[0100]

5 [Fourth Embodiment]

In the above embodiments, an example in which the medicine carts 101-1 to 101-N each include the memory chip 501 that stores contained medicine information in a rewritable manner has been described, but the medicine information stored in the memory chip 501 may be configured to be sent to the warehouse management system 201.

10 [0101]

[Effects of Fourth Embodiment]

In the present embodiment, the medicine carts 101-1 to 101-N can quickly notify the warehouse management system 201 of the medicine information stored in the memory chip 501.

15 [0102]

[Fifth Embodiment]

In the above embodiments, the case where the hospital ship system 206 does not identify the types of the medicines stored in the warehouse in the management has been described, but a configuration may be such that an emergency medicine storage unit
20 configured to store emergency medicine information specified on the basis of the classification of the emergency is equipped in a specific memory area of the entering-dispatching status storage unit 210, the controller C1 configured to decide the dispatchability of the highly-urgent medicines specified is equipped, and when the

controller C1 has decided that the highly-urgent medicines is dispatchable, the transportation control means 212 sends the medicine carts 101-1 to 101-N to the dispatch port during navigation so that the medicines can be carried out immediately after the multifunctional ship is moored at a port where the ship will approach.

5 [0103]

[Effects of Fifth Embodiment]

In the present embodiment, in the disaster area, medicines, particularly designated highly-demanded medicines are prioritized to be transported out of the ship, thereby improving convenience for health professionals waiting for specified medicines.

10 [0104]

[Sixth Embodiment]

In the above embodiments, the controller C2 can grasp the arranged location status of the medicine carts 101-1 to 101-N, but a worker cannot visually grasp the arranged location status of the medicine carts 101-1 to 101-N. Therefore, control may be
15 incorporated so that the controller C2 of the warehouse management system 201 receives the arranged location status from the medicine carts 101-1 to 101-N, makes the arranged location map of the medicine carts 101-1 to 101-N carried in the multifunctional ship, and displays the resulting location map on a display device (not shown).

[0105]

20 [Effects of Sixth Embodiment]

In the present embodiment, a worker in the multifunctional ship can visually grasp the arranged location status of the medicine carts 101-1 to 101-N. The worker can thus visually understand the locations of the medicine carts 101-1 to 101-N containing

required medicines even when the medicine collecting robot is out of order.

Required medicines can thus be collected and delivered to health professionals in the ship waiting for the medicines, and improvement in the medical services can be expected.

[0106]

5 [Seventh Embodiment]

In the above embodiments, an example in which control of moving the arranged locations of the medicine carts 101-1 to 101-N is not performed has been described, but a configuration may be to respond to some sort of communication problems occurred to any of medicine carts 101-1 to 101-N in the ship.

10 Specifically, the controller C2 of the warehouse management system 201 may be configured to communicate with the medicine carts 101-1 to 101-N to identify the actual locations and instruct the arrangement changes of the medicine carts.

[0107]

[Effects of Seventh Embodiment]

15 In the present embodiment, it is possible to flexibly respond to some sort of communication problems occurred to any of medicine carts 101-1 to 101-N in the ship, and downtime for restoring after system failure is expected to be shortened.

[0108]

[Eighth Embodiment]

20 In the above embodiments, an example in which the medicine collecting robot 300 transports a designated medicine using the first elevator 71 or the second elevator 72 has been described, but when the medicine collecting robot 300 collects a predetermined medicine from any of the medicine carts 101-1 to 101-N in units of lots, the controller C2

of the warehouse management system 201 may instruct the medicine collecting robot 300 to transport the medicine taken out in units of lots to the replenishment port led to the receipt port of each medical workspace.

[0109]

5 [Effects of Eighth Embodiment]

In the present embodiment, since the travel distance of the medicine collecting robot 300 for collecting the medicines can be reduced, the time required for collecting medicines by the medicine collecting robot 300 can be shortened, and the medicines in units of small lot can be efficiently and quickly collected and delivered to a health professional performing medical activities in the multifunctional ship.

[0110]

The disclosure of the present invention above can be summarized as at least the following articles.

[0111]

15 (1) Provided is a ship control system configured to control navigation of a multifunctional ship having both a medical ship function and a storage ship function; a hospital ship system including a device configured to offer a predetermined medical service in the multifunctional ship; a warehouse management system configured to store a location of a medicine stored in a medicine warehouse in the multifunctional ship and
20 to control entering or dispatching of the medicine; and an emergency information system configured to indicate maneuver for the multifunctional ship, the ship control system, the hospital ship system, the warehouse management system, and the emergency information system being configured to communicate with each other to allow the medical ship

function and the storage ship function to complementarily function.

[0112]

(2) In the hospital ship system, the device configured to offer the medical service includes a medical device adapted to medical care classification, a medical diagnostic
5 device, and an examining table, and the warehouse management system includes entering-dispatching status storage means configured to store a status of entering or dispatching of a regular medicine prescribed based on the medical care classification and a medicine for emergency to be prescribed for a disaster relief, counting means configured to count a stock of the regular medicine and a stock of the medicine for emergency stored
10 in the storage means with a link to storage locations, and notification means configured to notify the emergency information system of medicine information counted by the counting means.

[0113]

(3) Provided is a medicine cart configured to contain a received medicine and
15 transportation control means configured to control automatic carrying of the medicine cart into a storage box arranged in the ship or automatic carrying the medicine cart out of the storage box to outside of the ship.

[0114]

(4) The medicine cart includes a travel controller configured to achieve self-propelling
20 on a transportation route arranged for the storage box in accordance with transportation route information received and stopping at a designated location.

[0115]

(5) The travel controller is configured to determine a transportation direction of the

medicine cart while reading identification information provided in each layer of the ship in accordance with storage location information received from the transportation control means.

[0116]

- 5 (6) When the medicine cart is carried in the ship, the transportation control means is configured to perform control such that the medicine cart is carried in from an uppermost deck of the multifunctional ship in the bottom direction of the ship via an elevator.

[0117]

- 10 (7) The transportation control means is configured to perform control to open a rear door of the medical ship when the medicine cart is carried into the ship and carry in the medicine cart from the quay side in the bottom direction of the ship.

[0118]

- 15 (8) The hospital ship system includes sharing means configured to communicate with other multifunctional ships and share latest medicine equipment information acquired.

[0119]

- 20 (9) The inside of the multifunctional ship is constituted of a plurality of stories any of which is provided with a transportation network formed of a planar transport route on which the medicine cart moves in a longitudinal direction or a transverse direction and an elevation transport route on which the medicine cart moves in an up-down direction from a deck.

[0120]

- (10) The medicine cart includes a memory chip configured to store contained medicine information in a rewritable manner and transmitting means configured to send the

medicine information stored in the memory chip to the warehouse management system.

[0121]

(11) The hospital ship system includes decision means including an emergency medicine storage unit configured to store emergency medicine information specified
5 based on classification of an emergency and being configured to specify disaster classification from disaster information received by the ship control system and to decide the dispatchability of the specified urgent medicine, and when the decision means decides that the urgent medicine is dispatchable, the transportation control means is configured to send the medicine cart to be dispatched to a dispatch port during navigation so that the
10 medicine can be carried out immediately after the multifunctional ship is moored at a port where the ship will approach.

[0122]

(12) The warehouse management system includes making means configured to receive medicine information sent from the transmitting unit and make an arranged location map
15 of the medicine cart carried in the multifunctional ship and display means configured to display the arranged location map made by the making means.

[0123]

(13) The warehouse management system includes first instruction means configured to communicate with a plurality of medicine carts to identify an actual location and instruct
20 the medicine carts to change an arrangement.

[0124]

(14) A medicine collecting robot configured to collect a predetermined medicine in units of lots from any of the medicine carts is included, and the warehouse management

system includes second instruction means configured to instruct the medicine collecting robot to transport the medicine taken out in units of lots to a replenishment port led to a receipt port of each medical workspace.

[0125]

- 5 Each step of the present invention can be implemented also by executing software (program) acquired via a network or various storage media on a processing unit (CPU or processor) such as a PC (computer).

[0126]

- 10 The present invention is not limited to the above embodiments, but various modifications (including organic combinations of the embodiments) are possible on the basis of the gist of the present invention and should not be excluded from the scope of the present invention.

[Industrial Applicability]

[0127]

- 15 To describe industrial applicability, the description in the technical problem section will be supplemented.

[0128]

- 20 In the current situation of distribution warehouses for land transportation, the areas tend to be concentrated due to site locations attracted by road convenience or the like and invitations by local governments. Furthermore, the demand for distribution warehouses is increasing more than ever due to changes in purchasing activity and the rise of Amazon (registered trademark) and the like, so that the recent situation is to have difficult in securing a distribution center at a good location.

[0129]

Accordingly, rent or construction cost including land price for distribution warehouse is rising.

[0130]

5 Furthermore, the Japanese Islands at present are in the active period of earthquakes and volcanic eruptions since 2011 Tohoku Earthquake and Tsunami, and it is difficult to specify when and where a disaster will occur. Once a disaster such as an earthquake has occurred, the situation will be such that land routes will be cut, physical
distributions will be delayed, and transport vehicles will be inaccessible to distribution
10 warehouses storing medicines.

[0131]

Any warehouse constructed on land by the central government or local governments cannot avoid such risk. In this invention, such problems should be solved by moving (shifting) distribution warehouses, particularly warehouses storing medicines, from land
15 to sea.

[0132]

In particular, in Japan surrounded by sea, taking advantage of the natural environment peculiar to an island country should ensure the peace of the people of Japan and lead to development of new industries and schemes like no other in the world.

20 [0133]

Specifically, in Japan, which is a country experiencing many earthquakes, the effects of interruption of land transportation due to a volcanic earthquake, a volcanic eruption, or the like can be internally avoided and a stable supply of medicines can be expanded.

In addition, in case of disasters in a Southeast Asian country or the like, which is an island country like Japan, the support by navigating this ship to the affected country or the export of the know-how related to this ship constructed and the system therefor, can lead to the worldwide contribution and the creation and development of new industries.

5 [0134]

In particular, the creation of new industries not only in the shipbuilding industry and the shipping industry suffering from low-cost competition and a surplus in ships but also in the permanent ports of call (Japan), and adding a new viewpoint to the state of the national security of Japan by relief activities in other countries should effect a
 10 contribution to further enhancement of comprehensive national strength.

[Reference Signs List]

[0135]

- 1-1 multifunctional ship
- 1-2 multifunctional ship
- 15 1-3 multifunctional ship
- 1-4 multifunctional ship
- 1-5 multifunctional ship
- 1-6 multifunctional ship
- 1-7 multifunctional ship
- 20 2 emergency information system
- 3 administrative communication department

CLAIMS

[Claim 1]

A multifunctional ship system comprising: a ship control system configured to control navigation of a multifunctional ship having both a medical ship function and a storage
5 ship function; a hospital ship system including a device configured to offer a predetermined medical service in the multifunctional ship; a warehouse management system configured to store a location of a medicine stored in a medicine warehouse in the multifunctional ship and to control entering or dispatching of the medicine; and an
10 emergency information system configured to indicate maneuver for the multifunctional ship, wherein the ship control system, the hospital ship system, the warehouse management system, and the emergency information system are configured to communicate with each other to allow the medical ship function and the storage ship function to complementarily function.

15 [Claim 2]

The multifunctional ship system according to claim 1, wherein, in the hospital ship system,

the device configured to offer the medical service includes a medical device adapted to a medical care classification, a medical diagnostic device, and an examining table, and

20 the warehouse management system includes:

entering-dispatching status storage means configured to store a status of entering or dispatching of a regular medicine prescribed based on the medical care classification and a medicine for emergency to be prescribed for a disaster relief;

counting means configured to count a stock of the regular medicine and a stock of the medicine for emergency stored in the storage means with a link to storage locations; and

notification means configured to notify the emergency information system of medicine information counted by the counting means.

5

[Claim 3]

The multifunctional ship system according to claim 1, comprising: a medicine cart configured to contain a received medicine; and

transportation control means configured to control automatic carrying of the medicine
10 cart into a storage box arranged in the ship or automatic carrying the medicine cart out of the storage box to outside of the ship.

[Claim 4]

The multifunctional ship system according to claim 3, wherein the medicine cart
15 includes a travel controller configured to achieve self-propelling on a transportation route arranged for the storage box in accordance with transportation route information received and stopping at a designated location.

[Claim 5]

20 The multifunctional ship system according to claim 4, wherein the travel controller is configured to determine a transportation direction of the medicine cart while reading identification information provided in each layer of the ship in accordance with storage location information received from the transportation control means.

[Claim 6]

The multifunctional ship system according to claim 4, wherein, when the medicine cart is carried in the ship, the transportation control means is configured to perform control
5 such that the medicine cart is carried in from an uppermost deck of the multifunctional ship in a bottom direction of the ship via an elevator.

[Claim 7]

The multifunctional ship system according to claim 4, wherein the transportation
10 control means is configured to perform control to open a rear door of the medical ship when the medicine cart is carried into the ship and carry in the medicine cart from a quay side in a bottom direction of the ship.

[Claim 8]

15 The multifunctional ship system according to claim 1, wherein the hospital ship system includes sharing means configured to communicate with other multifunctional ships and share latest medicine equipment information acquired.

[Claim 9]

20 The multifunctional ship system according to claim 1 or 3, wherein inside of the multifunctional ship is constituted of a plurality of stories any of which is provided with a transportation network formed of a planar transport route on which the medicine cart moves in a longitudinal direction or a transverse direction and an elevation transport route

on which the medicine cart moves in an up-down direction from a deck.

[Claim 10]

The multifunctional ship system according to claim 3, wherein the medicine cart
5 includes: a memory chip configured to store contained medicine information in a
rewritable manner; and

transmitting means configured to send the medicine information stored in the memory
chip to the warehouse management system.

10 [Claim 11]

The multifunctional ship system according to claim 1, wherein the hospital ship system
includes decision means including an emergency medicine storage unit configured to
store emergency medicine information specified based on classification of an emergency
and being configured to specify disaster classification from disaster information received
15 by the ship control system and to decide the dispatchability of the specified urgent
medicine, and

when the decision means decides that the urgent medicine is dispatchable, the
transportation control means is configured to send the medicine cart to be dispatched to a
dispatch port during navigation so that the medicine can be carried out immediately after
20 the multifunctional ship is moored at a port where the ship approaches.

[Claim 12]

The multifunctional ship system according to claim 1, wherein the warehouse

management system includes: making means configured to receive medicine information sent from the transmitting unit and make an arranged location map of the medicine cart carried in the multifunctional ship; and

display means configured to display the arranged location map made by the making
5 means.

[Claim 13]

The multifunctional ship system according to claim 1, wherein the warehouse management system includes first instruction means configured to communicate with a
10 plurality of medicine carts to identify an actual location and instruct the medicine carts to change an arrangement.

[Claim 14]

The multifunctional ship system according to claim 13, further including a medicine
15 collecting robot configured to collect a predetermined medicine in units of lots from any of the medicine carts,

wherein the warehouse management system includes second instruction means configured to instruct the medicine collecting robot to transport the medicine taken out in units of lots to a replenishment port led to a receipt port of each medical workspace.