

SMART CONTAINER SYSTEM

BACKGROUND

Field

5 [1] The present disclosure relates to a container and, more particularly, to a smart container system intended to broaden the range of uses of a container by allowing the container to be used as an intermediate base of a courier system or a logistics warehouse.

Description

10 [2] A container is generally defined as being a large box-shaped receptacle made of a metal, used to efficiently and economically transport cargo. Such a container is designed to facilitate loading and carriage and to effectively protect cargo.

[3] The classical definition of containers has been broadened, such that containers are used, for example, as container houses or container swimming pools. Such examples will be described in more detail as follows.

20 [4] Patent Document 1 discloses a container house providing a prefabricated residential space for persons to live in. More particularly, interior house materials are provided within a container, and electrical wires and furniture are provided, thereby providing a residential space.

[5] Patent Document 2 discloses a container swimming pool that is inexpensive and has a rigid structure. A pool may be provided within a container, so that a swimming pool can be easily emplaced in an intended place or may be transported
5 freely.

[6] In addition to Patent Documents 1 and 2, an approach of constructing an electronic games room or the like using a container has been disclosed.

[7] However, houses or swimming pools using containers of the
10 related art are widely used in real life, and demand therefor is limited, in consideration of the use thereof. Since containers must be modified or changed, it is insufficient to regard such houses or swimming pools using containers as a reference for the broadening of the use of containers.

15 [8] The information disclosed in the Background section is only provided for a better understanding of the background and should not be taken as an acknowledgment or any form of suggestion that this information forms prior art that would already be known to a person skilled in the art.

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Related Art Document

[9] Patent Document 1: Korean Patent No. 10-1855934

[10] Patent Document 1: Korean Patent No. 10-1784469

BRIEF SUMMARY

[11] Various aspects of the present disclosure provide a smart container system intended as a means for broadening the range of use of a container by allowing the container to be used as a courier warehouse, a logistics warehouse, a frozen or refrigerated storage building, a shopping mall building, or a farm building.

[12] Also provided is a smart container system that can be used to construct a shopping mall or a logistics center or allow an unmanned store to be operated.

[13] According to an aspect, a smart container system may include: a container having a shape of a rectangular box; a rack disposed in an internal space of the container, the internal space communicating with an entrance of the container; a container-enlarging unit disposed outside of the container to enlarge the internal space; an input-output unit disposed in one face of the container-enlarging unit facing the entrance; and an unmanned truck reciprocally moving between the container and the container-enlarging unit through the internal space.

[14] The unmanned truck may be one selected from among an automated guide vehicle (AGV), a shuttle, a stacker crane, and the like.

[15] The input-output unit may include: a pair of openings spaced apart from each other; and a door unit disposed in an internal space of the container-enlarging unit to open and

close the openings.

[16] The smart container system may further include an inner conveyor unit disposed in the internal space of the container-enlarging unit to transport goods when the goods are input or
5 output via the input-output unit.

[17] The smart container system may further include a movable outer conveyor unit connected to the inner conveyor unit via the input-output unit.

[18] One face of the container-enlarging unit, crossing the
10 entrance of the container, may be open, and a door may be disposed in the open face.

[19] One face of the container-enlarging unit, crossing the entrance of the container, may be open. The containers and the container-enlarging units may be stacked in stages in a
15 vertical direction and arrayed in rows in a horizontal direction, and may be arranged such that the internal spaces of the stages are shared through the open faces.

[20] The inner conveyor unit may be disposed in a lower stage of the internal spaces of the container-enlarging units. The
20 smart container system may further include a central control device in an upper stage of the internal spaces, with a charger of the unmanned truck being provided in the central control device.

[21] The smart container system may further include a lift
25 disposed in a lower stage and an upper stage of the internal

spaces defined in the container-enlarging units to hoist and lower the unmanned truck.

[22] The lift may include: vertical guide rails defining a hoistway between the upper stage and the lower stage of the internal spaces; a lift shaft erected in a central portion of the hoistway; and a lift platform moving up and down along the vertical guide rails using an electric hoisting motor disposed on the lift shaft.

[23] The above and other objects, features, and advantages of the present disclosure will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings.

[24] In the meantime, terms and words used in the specification and the appended claims should not be interpreted as having ordinary or dictionary meanings, but as meanings and concepts conforming to the technical spirit of the present disclosure based on the principle that an inventor may properly define the concept of the terms at his/her own discretion in order to describe the invention in the best manner possible.

[25] According to an exemplary embodiment, the use of a container can be effectively broadened by the use of racks disposed within an inner space of the container and a container-enlarging unit disposed outside of the container. The broadening of the user of containers can improve the possibility of a method that is actually useful for real life.

[26] In addition, according to an exemplary embodiment, a container system having a stacked and arrayed structure can be provided to facilitate the construction of a shopping mall or a logistics center. Accordingly, the use of containers can be further broadened. Containers can be emplaced and operated as an unmanned store, an unmanned locker, a courier locker, an unmanned bookstore, an unmanned library, an unmanned farm, and the like. Since unmanned facilities can reduce labor, costs can be reduced.

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BRIEF DESCRIPTION OF THE DRAWINGS

[27] The above and other objects, features and advantages of the present disclosure will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

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FIG. 1 is an assembled perspective view illustrating a smart container system according to an exemplary embodiment;

FIG. 2 is a side elevation view illustrating key portions of the smart container system according to an exemplary embodiment;

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FIG. 3 is a perspective view illustrating the input-output unit of the smart container system according to an exemplary embodiment;

FIG. 4 is a perspective view illustrating the internal structure of the smart container system according to an

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exemplary embodiment;

FIG. 5 is a perspective view illustrating a smart container system including containers and container-enlarging units stacked and arrayed according to another exemplary
5 embodiment;

FIG. 6 is a perspective view illustrating an internal structure of the smart container system illustrated in FIG. 5;

FIG. 7 is a perspective view illustrating key portions of the smart container system illustrated in FIG. 6;

10 FIG. 8 is a side elevation view of FIG. 7; and

FIG. 9 is a plan view of FIG. 7.

DETAILED DESCRIPTION

[28] Hereinafter, reference will now be made to embodiments of
15 the present disclosure in detail, examples of which are illustrated in the accompanying drawings. Reference should be made to the drawings, in which the same reference numerals and symbols may be used to designate the same or like components. In the following description of the present disclosure,
20 detailed descriptions of known functions and components incorporated herein will be omitted in the case that the subject matter of the present disclosure may be rendered unclear thereby.

[29] It will be understood that, while terms, such as "first,"
25 "second," "A," "B," "(a)," and "(b)," may be used herein to

describe various elements, such terms are merely used to distinguish one element from another element. The substance, sequence, or order of such elements are not limited by these terms. It will be understood that when an element is referred to as being "connected to" or "coupled to" another element, not only can it be "directly connected or coupled to" the other element, but it also can be "indirectly connected or coupled to" the other element via an "intervening" element.

10 [30] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[31] As illustrated in FIGS. 1 to 4, a smart container system according to an exemplary embodiment includes a container 10. 15 The container 10 may be provided in a standard configuration having the shape of a rectangular box. The smart container system may be provided in an empty lot, such as an open-air yard, using the container 10.

[32] One face of the container 10, in the longitudinal direction, is open, thereby forming an entrance 11, through which an internal space 12 is open externally. That is, one face among six faces of the container 10, in the longitudinal direction, is open to form the entrance 11, through which the internal space 12 is open externally. 20

25 [33] The smart container system including the contain 10,

according to an exemplary embodiment, further includes one or more racks 20 disposed and operated in an internal space 12 of the container 10 and a container-enlarging unit 30 disposed outside of the container 10 to enlarge the internal space 12.

5 [34] In addition, the smart container system further includes an input-output unit 40 disposed in one face of the container-enlarging unit 30 and an unmanned truck 50 for reciprocating between the container 10 and the container-enlarging unit 30 to load goods, input via the input-output unit 40, onto the racks
10 20 or to output goods, loaded on the racks 20, via the input-output unit 40.

[35] The racks 20 respectively include, for example, vertical frames 20a arranged at equal distances and a plurality of stages of shelves 20b connected to the vertical frames 20a to
15 extend in the longitudinal direction. The racks 20 are disposed and operated in the internal space 12 of the container 10 communicating with the entrance 11. The racks 20 may be arranged as a pair of racks facing each other at a predetermined distance such that an aisle is provided
20 therebetween.

[36] According to the present exemplary embodiment, a variety of goods can be loaded or a variety of plants can be cultivated on the racks 20. For example, the smart container system according to an exemplary embodiment may be used as an
25 intermediate base between a courier company and consumers, such

as a courier warehouse, in which a courier company stores goods, so that customers can collect such goods. The smart container system may be used as a logistics warehousing in which a lot of goods are stored or may be used as a frozen or refrigerated storage in which the internal space 12 is partitioned. In addition, the smart container system may be used as a shopping mall, a book rental store, or a farm.

[37] When the smart container system according to an exemplary embodiment is used as a farm, the internal space 12 of the container 10 may be configured such that ultraviolet (UV) rays may be irradiated thereto or moisture may be supplied thereto. For power supply, photovoltaic equipment may be provided on a top portion or a side surface of the container 10.

[38] The container-enlarging unit 30 according to an exemplary embodiment is configured to enlarge the internal space 12 of the container 10, and is disposed outside of the container 10, in the longitudinal direction.

[39] In this regard, the container-enlarging unit 30 is a polyhedron, for example, faces of which are defined by vertically and horizontally connecting outer frames 32, which may be interpreted as being typical beams, and connecting iron plates to the outer frames 32, such that a top face 33, a bottom face 34, a front face 35, and side faces 35 are provided. Although the container-enlarging unit 30 illustrated as the polyhedron in the drawings, the container-enlarging unit is not

limited thereto.

[40] The rear face of the container-enlarging unit 30, adjoining the entrance 11 of the container 10, is open, such that the internal space 12 of the container 10 is enlarged through the open rear face. The input-output unit 40 is provided in the front face 35 facing the entrance 11, such that goods can be input from the outside and can be unloaded and output from the racks 20.

[41] The container-enlarging unit 30 may be configured such that the left face thereof on the drawings, intersecting the entrance 11 of the container 10, is open. A door 22 for opening and closing the internal space of the container-enlarging unit 30 may be provided in the open left face.

[42] It should be noted in advance that the space provided within the container-enlarging unit 30 will be referred to as an auxiliary internal space 31 hereinafter so as to not be confused with the internal space 12 of the container 10. In addition, a container door provided in the fabrication of the container 10 may be used as the door 22.

[43] The input-output unit 40 is provided in the front face 35 of the container-enlarging unit 30 to communicate the auxiliary internal space 31 with the outside. In this regard, the input-output unit 40 has the openings 41. For example, a pair of openings 41 may be disposed at a distance in order to facilitate rapid input and output of goods.

[44] In addition, the input-output unit 40 may include a door unit 42 configured to open and close the openings 41 and a plurality of conveyor rollers 43 rotatably disposed on the bottom of the openings 41 to facilitate the input and output of goods.

[45] In the input-output unit 40, the door unit 42 includes, for example, sliding doors 42a located in the auxiliary internal space 31 to open and close the openings 41. Each of the sliding doors 42a may operate using sensors to automatically sense the unmanned truck 50 to open and close an opening 41 corresponding thereto when the unmanned truck 50 approaches the opening 41 to input or output goods.

[46] The unmanned truck 50 is a vehicle automatically transporting goods without being directly controlled by a person, and is typically referred to as an automated guided vehicle (AGV). The unmanned truck 50 used herein may be one of known unmanned trucks, having an appropriate specification. It should be understood, however, that the unmanned truck 50 is not limited to the AGV, since the unmanned truck 50 may be one of other known transport vehicles, such as a shuttle, a stacker crane, or the like.

[47] The unmanned truck 50, as described above, is disposed in the auxiliary internal space 31 to reciprocally move between the container 10 and the container-enlarging unit 30 to load input goods onto the racks 20 disposed in the internal space 12

or automatically transport and output goods from the racks 20.

[48] According to the present exemplary embodiment, due to the racks 20 disposed in the internal space 12 and the container-enlarging unit 30 enlarging the internal space 12, the container 10 can be used for a variety of purposes. Accordingly, the container 10 can be effectively enlarged.

[49] The smart container system according to an exemplary embodiment further includes inner conveyor units 60 disposed in the auxiliary internal space 31 and an outer conveyor unit 70 connected to the inner conveyor units 60 via the input-output unit 40 in order to facilitate the input and output of goods via the input-output unit 40.

[50] For example, each of the inner conveyor units 60 includes a fixed frame 61 disposed in the auxiliary internal space 31 and a plurality of rollers 62 rotatably disposed on top of the fixed frame 61. The inner conveyor unit 60 allows goods to slide thereon, so that goods input via the opening 41 can be delivered to the unmanned truck 50 or goods transported by the unmanned truck 50 can be output via the opening 41 corresponding thereto. The inner conveyor unit 60 may be implemented as a typical roller conveyor.

[51] The number of the inner conveyor units 60 is the same number as the number of the openings 41, such that one inner conveyor unit 60 is disposed and operated for every opening 41. It is illustrated in the drawings that a pair of inner conveyor

units 60 are disposed in association with a pair of openings 41, respectively.

[52] The outer conveyor unit 70 is provided by modifying a typical AGV by applying a roller conveyor to the top portion of the AGV. Unlike the stationary inner conveyor units 60, the
5 outer conveyor unit 70 is configured to be movable to transport goods.

[53] The outer conveyor unit 70 can reciprocally move between the pair of openings 41 disposed in the input-output unit 40,
10 thereby facilitating the input and output of goods.

[54] According to the present embodiment, the inner conveyor units 60 and the outer conveyor unit 70 can be operated in association with the unmanned truck 50 and the input-output unit 40 in order to facilitate the input and output of goods,
15 thereby improving the convenience of the smart conveyor system. In addition, since the smart conveyor system can be operated as an unmanned store, it is possible to effectively reduce costs.

[55] As illustrated in FIGS. 5 to 9, a smart container system
20 according to another exemplary embodiment includes containers 10 and container-enlarging units 30, which are stacked in two stages in a vertical direction and arrayed in two rows in a horizontal direction. Each of the container-enlarging units 30 is configured such that one face thereof, crossing the
25 entrances 11 of the containers 10, is open.

[56] That is, a smart container system comprised of four containers 10 and four container-enlarging units 30 stacked in the vertical direction and arrayed in the horizontal direction is illustrated by way of example. It should be understood,
5 however, that this configuration is merely an example, and the present disclosure is not limited thereto.

[57] The container-enlarging units 30 are arranged so as to share the auxiliary internal spaces 31 in respective stages through the open faces. Thus, the internal spaces 12 of the
10 containers, in which the racks 20 are disposed, are also shared.

[58] In addition, the container-enlarging units 30 may be configured such that both faces, crossing the entrances 11, are open. Doors 22 may be disposed in the left of the drawings, allowing the auxiliary internal spaces 31 to be opened and
15 closed for the inspection and maintenance of the system.

[59] In the smart container system, as described above, the inner conveyor units 60 may be disposed in the lower stage of the auxiliary internal spaces 31, while a central control device 52, with a charger 51 of the unmanned truck 50 being
20 provided or built therein, may be provided in the upper stage of the auxiliary internal spaces 31.

[60] The central control device 52 allows the unmanned truck 50 to be charged, provides a place in which the unmanned truck 50 stands by, and controls the overall operation of the smart
25 container shop.

[61] According to the present exemplary embodiment, the smart container system can be provided by stacking and arraying a plurality of containers, and it is effective in terms of the ability to enlarge the containers 10. This also facilitates the construction of a shopping mall, a logistics center, or the like. Accordingly, containers can have a direct effect on real life. In addition, the smart container system can be operated as an unmanned store using the central control device 52.

[62] In addition, the smart container system according to an exemplary embodiment further includes a lift 80 for hoisting and lowering the unmanned truck 50, so that the unmanned truck 50 can reciprocally move between the upper stage and the lower stage of the auxiliary internal spaces 31 provided in the container-enlarging units 30.

[63] The lift 80 extends between the upper stage and the lower stage of the auxiliary internal spaces 31 in order to hoisting and lowering the unmanned truck 50. The lift 80 is disposed in the right of the auxiliary internal spaces 31 in which none of the inner conveyor units 60 and the central control device 52 is disposed.

[64] The lift 80 includes vertical guide rails 81 defining a hoistway between the upper stage and the lower stage, a lift shaft 82 erected in a central portion of the hoistway, and a lift platform 84 moving up and down along the vertical guide rails 81 using an electric hoisting motor 83 disposed on the

lift shaft 82.

[65] For example, a set of four vertical guide rails 81 are disposed at corners of a rectangle, respectively, to define the hoistway. Each of the vertical guide rails 81 has a U-shaped cross-section. The lift shaft 82, having an H-shaped cross-section, is disposed in the central portion of the hoistway. The electric hoisting motor 83, acting as a power source motor, is provided in the front portion to operate by sensing that the unmanned truck 50 is aboard the lift platform 84.

[66] The electric hoisting motor 83 is disposed on top of the lift platform 84. The lift platform 84 has a rectangular shape, with corners thereof being connected to the vertical guide rails 81. When the electric hoisting motor 83 is operated, the lift platform 84 is hoisted and lowered along the vertical guide rails 81. When the electric hoisting motor 83 is carried downwardly, the electric hoisting motor 83 is held and fixed by a lift-fixing unit 90, which is provided in the lower stage of the auxiliary internal spaces 31.

[67] According to exemplary embodiments, goods can be easily transported on the lift 80, in the container system having a multi-stage structure, so that the convenience of transportation can be effectively improved. It is therefore possible to improve the reliability of the smart container system.

[68] Although the exemplary embodiments of the present disclosure have been described in detail, this is for illustrative purposes only. The smart container system according to the present disclosure is not limited thereto.

5 The foregoing descriptions and the accompanying drawings have been presented in order to explain certain principles of the present invention. It will be understood that the terms "comprise", "include", and "have", used herein specify the presence of stated elements but do not preclude the presence or
10 addition of any other elements unless explicitly noted. Unless otherwise defined, all terms including technical and scientific terms used herein have the same meaning as that which would be commonly understood by a person skilled in the art to which the present invention pertains. It will be further understood that
15 terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art, and will not be interpreted in an idealized or overly formal sense, unless defined expressly so herein.

20 **[69]** The foregoing descriptions and the accompanying drawings have been presented in order to explain the certain principles of the present invention. A person skilled in the art to which the present invention pertains could make many modifications and variations by combining, dividing, substituting for or
25 changing elements without departing from the principle of the

present invention. The foregoing embodiments disclosed herein shall be interpreted as being illustrative only, while not being limitative, of the principle and scope of the present invention. It should be understood that the scope of the
5 present invention shall be defined by the appended Claims and all of their equivalents fall within the scope of the present invention.

WHAT IS CLAIMED IS:

1. A smart container system comprising:

a container having a shape of a rectangular box;

5 a rack disposed in an internal space of the container,
the internal space communicating with an entrance of the
container;

a container-enlarging unit disposed outside of the
container to enlarge the internal space;

10 an input-output unit disposed in one face of the
container-enlarging unit facing the entrance; and

an unmanned truck reciprocally moving between the
container and the container-enlarging unit through the internal
space.

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2. The smart container system according to claim 1,
wherein the input-output unit comprises:

a pair of openings spaced apart from each other; and

a door unit disposed in an internal space of the
20 container-enlarging unit to open and close the openings.

3. The smart container system according to claim 1 or 2,
further comprising an inner conveyor unit disposed in the
internal space of the container-enlarging unit to transport
25 goods when the goods are input or output via the input-output

unit.

4. The smart container system according to claim 3,
further comprising a movable outer conveyor unit connected to
5 the inner conveyor unit via the input-output unit.

5. The smart container system according to claim 1,
wherein one face of the container-enlarging unit, crossing the
entrance of the container, is open, and
10 the containers and the container-enlarging units are
stacked in stages in a vertical direction and arrayed in rows
in a horizontal direction, and are arranged such that the
internal spaces of the stages are shared through the open faces.

15 6. The smart container system according to claim 5,
wherein the inner conveyor unit is disposed in a lower stage of
the internal spaces of the container-enlarging units,

the smart container system further comprising a central
control device in an upper stage of the internal spaces, with a
20 charger of the unmanned truck being provided in the central
control device.

7. The smart container system according to claim 5,
further comprising a lift disposed in a lower stage and an
25 upper stage of the internal spaces defined in the container-

enlarging units to hoist and lower the unmanned truck.

8. The smart container system according to claim 7,
wherein the lift comprises:

5 vertical guide rails defining a hoistway between the
upper stage and the lower stage of the internal spaces;

a lift shaft erected in a central portion of the
hoistway; and

a lift platform moving up and down along the vertical
10 guide rails using an electric hoisting motor disposed on the
lift shaft.