

system according to the embodiment in a first building.

[FIG. 4] FIG. 4 is a schematic plan view illustrating the transport system according to the embodiment in a second building.

[FIG. 5] FIG. 5(a) is a schematic plan view illustrating a track
5 of the transport system according to the embodiment in the first building in an enlarged manner. FIG. 5(b) is a schematic plan view illustrating the track of the transport system according to the embodiment in the second building in an enlarged manner.

[FIG. 6] FIG. 6(a) is a schematic plan view illustrating an
10 example of operation of the transport system according to the embodiment. FIG. 6(b) is a schematic plan view illustrating a continuation of FIG. 6(a).

[FIG. 7] FIG. 7(a) is a schematic plan view illustrating a
continuation of FIG. 6(b). FIG. 7(b) is a schematic plan view
15 illustrating a continuation of FIG. 7(a).

[FIG. 8] FIG. 8(a) is a schematic plan view illustrating a
continuation of FIG. 7(b). FIG. 8(b) is a schematic plan view
illustrating a continuation of FIG. 8(a).

[FIG. 9] FIG. 9(a) is a schematic plan view illustrating a
20 continuation of FIG. 8(b). FIG. 9(b) is a schematic plan view illustrating a continuation of FIG. 9(a).

[FIG. 10] FIG. 10(a) is a schematic plan view illustrating a
continuation of FIG. 9(b). FIG. 10(b) is a schematic plan view
illustrating a continuation of FIG. 10(a).

25 [FIG. 11] FIG. 11 is a schematic plan view illustrating a
continuation of FIG. 10(b).

the quantity of required transport and transport distance.

[0019] As illustrated in FIG. 2, each transport vehicle 10 includes a traveling carriage 144, a power-supply carriage 145 configured to receive power supply from the track 3, a θ drive 147, and a cross-feed unit 146 configured to feed a portion of the transport vehicle 10 lower than the cross-feed unit 146 laterally with respect to the track 3. The θ drive 147 turns a lifting drive unit 148 in a horizontal plane to control the attitude of a load L. The lifting drive unit 148 raises and lowers a lifting platform 149 holding the load L to deliver and receive the load L to and from a delivery port 4. The lifting platform 149 holds with a chuck a flange 120 of an upper portion of the load L. Herein, the cross-feed unit 146 and the θ drive 147 do not have to be provided.

[0020] The track 3 is installed on a ceiling, for example. The track 3 is supported by posts 141. The track 3 is a predetermined travel path, along which the transport vehicles 10 travel. The track 3 is a one-way travel path. In other words, in the transport system 1, as indicated by arrows in FIG. 3 and FIG. 4, the traveling direction (advancing direction) of each transport vehicle 10 on the track 3 is set to be one direction, and traveling in the opposite direction is prohibited. The track 3 has a closed track layout that is not affected by anything outside of the track 3. Hereinafter, the terms "upstream" and "downstream" correspond to "upstream" and "downstream" in the traveling direction of the transport vehicle 10, respectively.

[0021] In the example illustrated in FIG. 1, the track 3 includes a first main track 31, a second main track 32, four first branch tracks (branch tracks) 33a, 33b, 33c, 33d that diverge from the second main track 32

and merge into the first main track 31, and four second branch tracks 34a, 34b, 34c, 34d that diverge from the first main track 31 and merge into the second main track 32.

[0022] The first main track 31 and the second main track 32 are tracks
 5 extending within and between the first building F1 and the second building F2. The lengths of the first main track 31 and the second main track 32 are each 200 meters, for example. Within and between the first building F1 and the second building F2, the first main track 31 and the second main track 32 are surrounded and enclosed by a wall
 10 (not illustrated).

[0023] The first branch tracks 33a to 33d are disposed in the first building F1. The first branch tracks 33a to 33d extend straight in parallel. The first branch tracks 33a to 33d are provided in a comb-like shape between the first main track 31 and the second main track 32 that
 15 extend parallel. The first branch tracks 33a to 33d are located upstream of the first main track 31 (downstream of the second main track 32) in this order. The second branch tracks 34a to 34d are disposed in the second building F2. The second branch tracks 34a to 34d extend straight in parallel. The second branch tracks 34a to 34d
 20 are provided in a comb-like shape between the first main track 31 and the second main track 32 that extend parallel. The second branch tracks 34a to 34d are located upstream of the second main track 32 (downstream of the first main track 31) in this order.

[0024] As illustrated in FIG. 3 and FIG. 5(a), respective locations where
 25 the first branch tracks 33a to 33d merge into the first main track 31 are junction points 35a, 35b, 35c, 35d. The respective first branch tracks

33a to 33d are connected to the first main track 31 via the respective junction points 35a, 35b, 35c, 35d. In other words, the track 3 has the junction points 35a to 35d that are a plurality of junction points arranged on the first main track 31 so as to be apart from each other. The first
 5 branch tracks 33a to 33d are connected to the first main track 31 via the junction points 35a to 35d that are different from one another, respectively. The junction points 35a to 35d are apart from each other at predetermined distances on the first main track 31.

[0025] Respective locations where the first branch tracks 33a to 33d
 10 diverge from the second main track 32 are branch points 36a, 36b, 36c, 36d. The respective first branch tracks 33a to 33d are connected to the second main track 32 via the respective branch points 36a, 36b, 36c, 36d. In other words, the track 3 has the branch points 36a to 36d as a plurality of branch points that are arranged on the second main track 32
 15 so as to be apart from each other. The first branch tracks 33a to 33d are connected to the second main track 32 via the branch points 36a to 36d different from one another, respectively. The branch points 36a to 36d are apart from each other at predetermined distances on the second main track 32.

20 [0026] The "junction points" mean locations where branch tracks are connected to a main track. The "junction points" are locations where the branch tracks reach the main track. The "junction points" are connecting points of the branch tracks for entry therefrom into the main track. The "branch points" are locations where branch tracks are connected to a main
 25 track. The "branch points" are locations where the main track reaches the branch tracks. The "branch points" are

example.

[0032] The loading port 42 is a port for loading a load L onto a transport vehicle 10. The loading port 42 can convey a load L into a port in a span when a plurality of transport vehicles 10 continuously
5 arrive. The unloading port 42 is provided above the conveyor 44. The conveyor 44 conveys a load L to be loaded on the loading port 42 from the automated warehouse (not illustrated), for example.

[0033] Herein, the delivery port 4 may be displaced toward upstream or downstream in the transport direction of the transport vehicle 10 from a
10 transport surface of the conveyor C, so as not to stop transport of loads L by the conveyor C. The unloading port 41 and the loading port 42 are not limited to particular ones, and various known types of ports may be used. The specification, mechanism, configuration, or the like of the conveyors 43, 44 are not limited to particular ones, and various
15 known types of conveyors may be used.

[0034] As illustrated in FIG. 3, the controller 20 is an electronic control unit including a central processing unit (CPU), a read only memory (ROM), and a random-access memory (RAM). The controller 20 can be configured as, for example, software such that a program stored in
20 the ROM is loaded into the RAM to be executed by the CPU. The controller 20 may be configured as hardware such as an electronic circuit. The controller 20 communicates with the transport vehicles 10 to control traveling of the transport vehicles 10.

[0035] The controller 20 performs a starting control described below on
25 the respective transport vehicles 10 stopping at stop positions corresponding to the respective delivery ports 4 of the first branch track

these, the counts of the pitch timers in the first branch tracks 33c, 33d may be set so as to become zero at the same timing. In this case, the transport vehicles 10c, 10d stopping at the stop positions of the first branch tracks 33c, 33d are caused to start moving simultaneously.

[0054] FIG. 12 includes schematic plan views illustrating an example of an operation when the loading operation cannot be completed. As illustrated in FIG. 12(a), for example, if a time required for loading onto the transport vehicle 10d has been determined to exceed a time limit, it is considered that the loading operation onto the transport vehicle 10d cannot be completed, and the transport vehicle 10 is left empty without assigning a load L to the transport vehicle 10d. As illustrated in FIG. 12(b), when the count of the pitch timer has reached zero, the transport vehicle 10d is caused to start moving even without being loaded.

[0055] As described in the foregoing, the transport system 1 includes the first branch tracks 33a to 33d each having a stop position corresponding to the delivery port 4, and these first branch tracks 33a to 33d merge into the first main track 31. The transport system 1 also includes the second branch tracks 34a to 34d, each having a stop position corresponding to the delivery port 4, and these second branch tracks 34a to 34b merge into the second main track 32. This configuration enables a plurality of transport vehicles 10 to travel in a distributed manner for delivery and reception of loads L.

[0056] Furthermore, by the above-described starting control, the start timing of a transport vehicle 10 on a downstream branch track of the first branch tracks 33a to 33d is set simultaneous with or earlier than the start timing of a transport vehicle 10 on an upstream branch track of the