

DESCRIPTION

Title of Invention: TRAVELING VEHICLE SYSTEM

Technical Field

5 [0001] One aspect of the present invention relates to a traveling vehicle system.

Background Art

[0002] A traveling vehicle system is known in which a traveling vehicle autonomously travels on a traveling route including a plurality of one-
10 way circular routes provided in advance on a ceiling, a floor surface, or the like by computer control. In such a traveling vehicle system, for example, when a failure occurs in the traveling vehicle, other traveling vehicles cannot travel in a part of sections of the traveling route including a place where the traveling vehicle is stopped. In addition, also when
15 the track forming the traveling route is under maintenance, the traveling vehicle cannot travel a part of the traveling route under maintenance. For example, in the traveling vehicle system described in Patent Document 1, a section in which the traveling vehicle cannot travel as described above is set as a non-travelable section in which entry of the
20 traveling vehicle is prohibited, and control is performed so that the traveling vehicle does not enter the non-travelable section.

Citation List

Patent Literature

[0003] Patent Document 1: WO 2015/186440

25 **Summary of Invention**

Technical Problem

[0004] However, in the conventional traveling vehicle system described above, when a predetermined route is set as a non-travelable section, for example, in a case where the non-travelable section is one of a route for entering a predetermined area and a route for exiting from the predetermined area, if the system continues to operate, traveling vehicles exist unevenly inside or outside the predetermined area, which may cause congestion in an area congested with the traveling vehicles.

[0005] Therefore, an object of one aspect of the present invention is to provide a traveling vehicle system capable of preventing a deviation in the number of traveling vehicles between areas even when a section in which the traveling vehicle cannot travel occurs.

Solution to Problem

[0006] (1) A traveling vehicle system according to one aspect of the present invention includes: a plurality of traveling vehicles; a plurality of areas in which the traveling vehicle can circle around in a one-way manner along a predetermined route; a first route capable of entering a first area that is one of the plurality of areas; a second route capable of exiting from the first area; an information acquisition unit configured to acquire information on a section in which the traveling vehicle cannot travel; and a traveling vehicle control unit configured to set a non-travelable section based on the information acquired by the information acquisition unit and control the traveling vehicle so as not to enter the non-travelable section, in which the traveling vehicle control unit additionally sets at least a part of one of the first route and the second route as the non-travelable section when the traveling vehicle cannot enter or exit from the first area as a result of setting at least a part of the

other of the first route and the second route as the non-travelable section, and causes the traveling vehicle not to be able to exit from or enter the first area.

[0007] In the traveling vehicle system having this configuration, when the traveling vehicle cannot move from the outside of the first area, which is one area, to the inside of the first area, the traveling vehicle is also prohibited from moving from the inside of the first area to the outside of the first area. Further, when the traveling vehicle cannot move from the inside of the first area, which is one area, to the outside of the first area, the traveling vehicle is also prohibited from moving from the outside to the inside of the first area. Therefore, it is possible to prevent the number of traveling vehicles present in the first area from greatly decreasing or greatly increasing. As a result, it is possible to prevent the first area and other areas other than the first area from becoming relatively congested or sparsely congested with the traveling vehicles. As a result, even when a section in which the traveling vehicle cannot travel occurs, it is possible to prevent occurrence of deviation in the number of traveling vehicles between areas.

[0008] (2) In the traveling vehicle system according to (1), the first route may be a route that connects the first area and a second area different from the first area among the plurality of areas and is movable from the second area to the first area, and the second route may be a route that connects the first area and the second area and is movable from the first area to the second area. In this configuration, when the traveling vehicle cannot move from the first area to the second area on the conveyance route connecting the two areas, the traveling vehicle also cannot move

from the second area to the first area. Therefore, it is possible to prevent the traveling vehicles from concentrating on one of the first area and the second area.

5 [0009] (3) In the traveling vehicle system according to (1) or (2), the traveling vehicle control unit may determine the traveling route of the traveling vehicle so that the traveling vehicle does not enter the non-travelable section. In this configuration, since the traveling route is searched while avoiding the non-travelable section, even when the non-travelable section is set, the traveling vehicle does not stop before the
10 non-travelable section. Therefore, it is possible to suppress occurrence of congestion caused by the non-travelable section.

[0010] (4) In the traveling vehicle system according to any one of (1) to (3), the traveling vehicle control unit may continue traveling of the traveling vehicle in the first area even after the first route and/or the
15 second route is set as the non-travelable section. In this configuration, even when movement between areas is not possible, movement within an area is possible.

[0011] (5) In the traveling vehicle system according to any one of (1) to (4), when a plurality of first routes are provided and one or a plurality of
20 second routes are provided, even if at least a part of the first route is set as the non-travelable section, the traveling vehicle control unit does not additionally set the second route as the non-travelable section as long as the traveling vehicle can enter the first area, and continues a state in which the traveling vehicle can exit from the first area. When a plurality
25 of second routes are provided and one or a plurality of first routes are provided, even if at least a part of the second route is set as the non-

travelable section, the traveling vehicle control unit may continue a state in which the traveling vehicle can enter the first area without additionally setting the first route as the non-travelable section as long as the traveling vehicle can exit from the first area. In this configuration, in a case where
5 a plurality of first routes and/or a plurality of second routes are provided, even in a case where at least a part of the plurality of routes is set as the non-travelable section, the possibility that traveling can be continued can be increased.

[0012] (6) In the traveling vehicle system according to any one of (1) to
10 (5), when a merging portion of the first route, a branch portion of the first route, a merging portion of the second route, and a branch portion of the second route are defined as nodal points, and a route interposed between the nodal points is defined as a section, the traveling vehicle control unit may additionally set the post-merging section as a non-travelable section when all sections adjacent to an upstream side of the
15 post-merging section adjacent to a downstream side of the merging portion are set as non-travelable sections, and may additionally set all sections adjacent to a downstream side of the pre-branch section as non-travelable sections when the pre-branch section adjacent to an upstream
20 side of the branch portion is set as a non-travelable section. In this configuration, even if all patterns of a combination of the non-travelable sections to be added when a part of the first route or the second route is set as the non-travelable section are not stored/determined, the non-travelable section to be added can be appropriately set even in a
25 complicated layout by additionally setting the non-travelable section in conjunction with a preset additional setting pattern.

Advantageous Effects of Invention

[0013] According to one aspect of the present invention, even when a section in which a traveling vehicle cannot travel occurs, it is possible to prevent a deviation in the number of traveling vehicles between areas.

Brief Description of Drawings

[0014] FIG. 1 is a schematic plan view illustrating a traveling vehicle system according to an embodiment.

FIG. 2 is a front view illustrating a traveling vehicle included in FIG. 1.

FIG. 3 is a block diagram illustrating a functional configuration of the traveling vehicle system of FIG. 1.

FIGS. 4(A) and 4(B) are examples of track layouts arranged between buildings.

FIG. 5 is a view illustrating an example of the track layout arranged between the buildings.

FIGS. 6(A) and 6(B) are views illustrating another example of the track layout arranged between the buildings.

Description of Embodiments

[0015] Hereinafter, an embodiment will be described with reference to the drawings. In the description of the drawings, the same elements are denoted by the same reference numerals, and redundant description will be omitted. The dimensional ratios in the drawings do not necessarily coincide with each other.

[0016] As illustrated in FIG. 1, a traveling vehicle system 1 is a system for conveying an article F between placement parts 90,90 using an overhead traveling vehicle (traveling vehicle) 5 movable along a track

(traveling route). Examples of an article F (see FIG. 2) include containers such as a front opening unified pod (FOUP) storing a plurality of semiconductor wafers and a reticle pod storing a glass substrate, and common parts.

5 [0017] Here, for example, a traveling vehicle system 1 in which an overhead traveling vehicle 5 (hereinafter, simply referred to as “traveling vehicle 5”) travels along a one-way track 11 laid on a ceiling or the like of a building in a factory or the like will be described as an example. The one-way track 11 is a one-way traveling path, a traveling direction
10 (forward direction) of the traveling vehicle 5 on the track 11 is set to one direction, and traveling in the opposite direction is prohibited. The track 11 has a closed track layout that is not affected from outside the track 11. Hereinafter, the terms “upstream” and “downstream” respectively correspond to “upstream” and “downstream” in the traveling direction
15 of the traveling vehicle 5.

[0018] The factory in which the traveling vehicle system 1 of the present embodiment is arranged includes a first building Fab1 and a second building Fab2. In each of the first building Fab1 and the second building Fab2, an area (second area) A1 and an area (first area) A2 in which a
20 track 11 capable of circular around and a plurality of placement parts 90 are arranged are formed. The area A1 and the area A2 are connected by a first route 11A capable of moving from the area A1 to the area A2 in one way and a second route 11B capable of moving from the area A2 to the area A1 in one way. The first route 11A and the second route 11B
25 are tracks 11 extending across the first building Fab1 and the second building Fab2, and form an inter-building conveyance route R. Between

the first building Fab1 and the second building Fab2, the first route 11A and the second route 11B are surrounded by a wall portion (not illustrated) and closed.

[0019] The placement parts 90 are arranged along the track 11 and are provided at positions where the article F can be delivered to and from the traveling vehicle 5. The placement parts 90 each include a buffer and a delivery port. On the buffer, the article F is temporarily placed. The buffer is, for example, a placement part 90 on which the article F is temporarily placed when the article F conveyed by the traveling vehicle 5 cannot be transferred to the delivery port due to a reason such that another article F is placed on the intended delivery port. The delivery port is a placement part 90 for delivering the article F to a semiconductor processing device (not illustrated) including, for example, a cleaning device, a film forming device, a lithography device, an etching device, a heat treatment device, and a flattening device. The processing device is not particularly limited, and may be a variety of devices. The traveling vehicle system 1 mainly includes a track 11, a plurality of traveling vehicles 5, and a system controller 70.

[0020] As illustrated in FIG. 2, the track 11 is laid, for example, near a ceiling which is an overhead space of a worker. The track 11 is provided on the ceiling. Note that the track 11 may be directly installed on the ceiling or may be indirectly installed on the ceiling via another member. The track 11 of the present embodiment is suspended via a support S fixed to the ceiling. The track 11 is a predetermined traveling path for causing the traveling vehicle 5 to travel.

[0021] The traveling vehicle 5 travels along the track 11 and conveys

the article F. The traveling vehicle 5 is configured to be able to transfer the article F. The traveling vehicle 5 is an overhead traveling unmanned carrier. The number of traveling vehicles 5 included in the traveling vehicle system 1 is not particularly limited, and is plural. The traveling vehicle 5 includes a main body part 6, a traveling part 18, and a traveling vehicle controller 50.

[0022] The main body part 6 includes a main body frame 22, a lateral feeding portion 24, a θ drive 26, a lift drive portion 28, a lift stage 30, and a fall prevention cover 33. The traveling part 18 includes a motor and the like, and causes the traveling vehicle 5 to travel along the track 11. The traveling part 18 includes, for example, a power receiving communication unit 20 that receives power from the track 11 side by non-contact power feeding.

[0023] The lateral feeding portion 24 laterally feeds the θ drive 26, the lift drive portion 28, and the lift stage 30 collectively in a direction perpendicular to the traveling direction of the track 11. The θ drive 26 rotates at least one of the lift drive portion 28 and the lift stage 30 within a predetermined angle range in a horizontal plane. The lift drive portion 28 elevates and lowers the lift stage 30 by reeling or unreeling a suspension member such as a wire, a rope, and a belt. The lift stage 30 is provided with a chuck, and can freely grasp or release the article F. For example, a pair of fall prevention covers 33 is provided in front of and behind the traveling vehicle 5 in the traveling direction. The fall prevention cover 33 causes a claw or the like (not illustrated) to protrude and retract below the article F to be conveyed, thereby preventing the article F from falling during conveyance.

[0024] The traveling vehicle controller 50 is an electronic control unit including a central processing unit (CPU), a read only memory (ROM), a random access memory (RAM), and the like. The traveling vehicle controller 50 controls various operations in the traveling vehicle 5. Specifically, the traveling vehicle controller 50 controls the traveling part 18, the lateral feeding portion 24, the θ drive 26, the lift drive portion 28, and the lift stage 30. The traveling vehicle controller 50 can be configured as, for example, software in which a program stored in the ROM is loaded onto the RAM and executed by the CPU. The traveling vehicle controller 50 may be configured as hardware by an electronic circuit or the like. The traveling vehicle controller 50 forms a position acquisition unit 51 and a vehicle body control unit 53 by loading a program stored in the ROM onto the RAM and executing the program by the CPU.

[0025] The position acquisition unit 51 is a unit that acquires the position of the host vehicle on the track 11. The position acquisition unit 51 may acquire information from, for example, a reading unit that reads a barcode or the like indicating point information attached to the track 11, an encoder, and the like. The position acquisition unit 51 transmits point information obtained by the reading unit and a travel distance after passing through the point obtained from the encoder to the system controller 70 as position data. The vehicle body control unit 53 controls the traveling vehicle 5 on the basis of information transmitted from the system controller 70.

[0026] The system controller 70 is a part that controls the traveling vehicle 5. As illustrated in FIG. 3, the system controller 70 includes an

input unit 71, a display unit 72, and a communication unit 73. The input unit 71 includes, for example, a keyboard, a mouse, and the like, and various operations and various setting values are input by the worker. The display unit 72 includes, for example, a liquid crystal display or the like, and displays various setting screens or displays an input screen or the like to be input by the input unit 71 or the like.

[0027] The communication unit 73 is a processing unit that communicates with other devices and the like, and for example, transmits information on a station to be arrived at and information for controlling the vehicle body control unit 53 to the traveling vehicle 5 via a wireless communication network, and receives the current position of the traveling vehicle 5 from the position acquisition unit 51. In addition, the communication unit 73 receives a conveyance instruction including information on stations as a start point and an end point from a host controller via, for example, a local area network (LAN).

[0028] The system controller 70 is a part that executes various control processes in the traveling vehicle system 1 described in detail later, and further includes a CPU, a ROM, a RAM, and a hard disk. The system controller 70 includes a reception unit (information acquisition unit) 74 as a conceptual part that executes various control processes in the traveling vehicle system 1, an abnormality determination unit (information acquisition unit) 75, and a traveling vehicle control unit 76. Such a conceptual part can be configured as, for example, software in which a program stored in the ROM is loaded on the RAM and executed by the CPU. Note that the system controller 70 may be configured as hardware by an electronic circuit or the like.

[0029] The reception unit 74 is a unit that receives information on a non-travelable section which is a section in which entry of the traveling vehicle 5 is prohibited. The reception unit 74 receives, via the input unit 71 in the system controller 70, information on a section which is set as a non-travelable section. For example, the reception unit 74 receives an identification (ID) number of a section input to the input unit 71 by the worker.

[0030] The abnormality determination unit 75 is a unit that determines that an abnormality has occurred in one traveling vehicle 5 when the one traveling vehicle 5 permitted to enter one nodal point by the traveling vehicle control unit 76 described later does not reach the one nodal point within a predetermined time. When determining that an abnormality has occurred in one traveling vehicle 5, the abnormality determination unit 75 outputs information to that effect to the traveling vehicle control unit 76.

[0031] The traveling vehicle control unit 76 is a unit that sets a non-travelable section which is a section in which entry of the traveling vehicle 5 is prohibited. The traveling vehicle control unit 76 is also a unit that controls the traveling vehicle 5 so as not to enter the set non-travelable section. The traveling vehicle control unit 76 sets the non-travelable section based on the information acquired by the reception unit 74 or the abnormality determination unit 75, and controls the traveling vehicle 5 so as not to enter the non-travelable section. Specifically, the traveling vehicle control unit 76 sets the non-travelable section based on the non-travelable section received by the reception unit 74 or the position information transmitted by the traveling vehicle 5 as

determined by the abnormality determination unit 75. The traveling vehicle control unit 76 does not cause the traveling vehicle 5 to enter the non-travelable section even when the target placement part 90 is present in the non-travelable section.

5 [0032] When one of the first route 11A that can enter the specific area (for example, the area A2) and the second route 11B that can exit from the specific area (for example, the area A2) is set as the non-travelable section, the traveling vehicle control unit 76 of the present embodiment additionally sets the other of the first route 11A and the second route 11B
10 as the non-travelable section.

[0033] Hereinafter, the control of the traveling vehicle control unit 76 in the inter-building conveyance route R in which a turning route R1 as shown in FIGS. 4(A) and 4(B) is formed will be described in detail. Here, a branch portion BP and a merging portion CP of the track 11 in the one-
15 way traffic are defined as nodal points P, and a track portion interposed between the nodal points P is defined as a section L. The first route 11A, which is a part of the inter-building conveyance route R of the present embodiment, has a section 11Aa, a section 11Ab, a section 11Ac, a section 11Ad, and a section 11Ae. The second route 11B has a section
20 11Ba, a section 11Bb, a section 11Bc, a section 11Bd, and a section 11Be. The turning route R1 has a section 11Ca, a section 11Cb, a section 11Cc, and a section 11Cd.

[0034] When all sections or some sections of the first route 11A that can enter the area A2 are set as non-travelable sections, the traveling vehicle
25 control unit 76 additionally sets all sections or some sections of the second route 11B that can exit from the area A2 as non-travelable

sections. For example, as illustrated in FIG. 4(A), when the traveling vehicle control unit 76 sets the section 11Ad (a partial section of the first route 11A) as the non-travelable section based on the information transmitted from the reception unit 74 or the abnormality determination unit 75, as illustrated in FIG. 4(B), the traveling vehicle control unit additionally sets the section 11Ba and the section 11Bb (a partial section of the second route 11B) as the non-travelable sections. When the section 11Ad is set as the non-travelable section, the traveling vehicle control unit 76 may set the section 11Ba, the section 11Bb, the section 11Bc, the section 11Bd, and the section 11Be (all sections of the second route 11B) as the non-travelable sections.

[0035] For example, when receiving the conveyance command from the host controller, the traveling vehicle control unit 76 searches for the traveling vehicle 5 that executes the conveyance command, and determines the traveling route of the traveling vehicle 5 so that the traveling vehicle 5 searched does not enter the non-travelable section set as described above. For example, when the section 11Ad, the section 11Ba, and the section 11Bb are set as the non-travelable sections as described above, the traveling route of the traveling vehicle 5 is determined so that the traveling vehicle 5 does not enter the non-travelable section.

[0036] The traveling vehicle control unit 76 continues the travel of the traveling vehicle 5 in the area A1 and the area A2 even after all or some sections of the first route 11A and/or all or some sections of the second route 11B are set as non-travelable sections. That is, the traveling vehicle control unit 76 permits the traveling vehicle 5 present in the area A1 to

travel in the area A1 and permits the traveling vehicle 5 present in the area A2 to travel in the area A2 so as not to enter the first route 11A and the second route 11B.

[0037] Next, the control of the traveling vehicle control unit 76 in the inter-building conveyance route R3 as shown in FIG. 5 will be described.

The inter-building conveyance route R3 is different from the inter-building conveyance route R in that there is not one first route 11A but a plurality of first routes 11A (two in FIG. 5) entering the area A2, and there is not one second route 11B but a plurality of second routes 11B (two in FIG. 5) exiting from the area A2.

[0038] In such an inter-building conveyance route R3, even if the traveling vehicle control unit 76 sets only one of all sections or some sections of one first route 11A of the two first routes 11A as non-travelable sections, the traveling vehicle control unit does not additionally set all sections or some sections of the second route 11B as non-travelable sections as in the inter-building conveyance route R. That is, when there are a plurality of first routes 11A that enter the area A2, the traveling vehicle control unit 76 sets a plurality of places of the first route 11A as the non-travelable sections, and only when the traveling vehicle 5 can no longer move from the area A1 to the area A2, additionally sets a part or all of the plurality of second routes 11B as the non-travelable section, so that the traveling vehicle 5 cannot move from the area A2 to the area A1.

[0039] Although not illustrated, in a case where there are a plurality of second routes 11B entering the area A1, similarly, the traveling vehicle control unit 76 additionally sets a part or all of the plurality of first routes

11A as a non-travelable section only when the traveling vehicle 5 cannot move from the area A1 to the area A2. In addition, in the above-described embodiment illustrated in FIG. 5, an example has been described in which there are two first routes 11A that enter the area A2, but there may be three or more first routes 11A. Similarly, the number of second routes 11B exiting from the area A2 may be three or more.

[0040] Next, the control of the traveling vehicle control unit 76 in the inter-building conveyance route R5 as shown in FIGS. 6(A) and 6(B) will be described. The inter-building conveyance route R5 is different from the inter-building conveyance route R in that there is not one second route 11B exiting from the area A2 but a plurality of second routes 11B (two in FIGS. 6(A) and 6(B)).

[0041] In such an inter-building conveyance route R5, the traveling vehicle control unit 76 sets all sections or some sections of only one first route 11A as non-travelable sections, and when the traveling vehicle 5 cannot move from the area A1 to the area A2, the traveling vehicle control unit 76 additionally sets all sections or some sections as non-travelable sections for all of a plurality of second routes 11B (in FIGS. 6(A) and 6(B), two second routes 11B exist). Further, the traveling vehicle control unit 76 sets all sections or some sections as non-travelable sections for all of the plurality of second routes 11B (in FIGS. 6(A) and 6(B), two exist), and additionally sets all sections or some sections of only one first route 11A as non-travelable sections when the traveling vehicle 5 cannot move from the area A2 to the area A1. That is, even if a partial section of the second route 11B is closed, the first route 11A is not closed when the traveling vehicle 5 can move from the

area A2 to the area A1.

[0042] Although not illustrated, also in a case where there are a plurality of first routes 11A entering the area A2 and there is one second route 11B exiting from the area A2, similarly, the traveling vehicle control unit 76 additionally sets all sections or some sections as non-travelable sections for all of the plurality of first routes 11A when all sections or some sections of the one second route 11B are set as non-travelable sections, and additionally sets all sections or some sections of only one second route 11B as non-travelable sections when all sections or some sections are set as non-travelable sections for the plurality of first routes 11A and thus the traveling vehicle 5 cannot move from the area A1 to the area A2.

[0043] Further, in the inter-building conveyance route R5 as shown in FIGS. 6(A) and 6(B), the branch portion BP and the merging portion CP are formed in the first route 11A and the second route 11B. In the inter-building conveyance route R5 in which the branch portion BP and the merging portion CP are formed, in addition to the above control, when all the sections adjacent to the upstream side of the post-merging section AL adjacent to the downstream side of the merging portion CP are set as the non-travelable sections, the traveling vehicle control unit 76 additionally sets the post-merging section AL as the non-travelable section. Specifically, when setting the section 11Bf and the section 11Bk, which are all the sections L adjacent to the upstream side of the section 11Bg, which is the post-merging section AL adjacent to the downstream side of the merging portion CP, as the non-travelable section, the traveling vehicle control unit 76 additionally sets the section 11Bg, which is the post-merging section AL, as the non-travelable section. The

traveling vehicle control unit 76 also executes similar control for the section 11Ah and the section 11Bi to be subjected to the post-merging section AL.

[0044] In addition, in addition to the above control, when the pre-branch section BL adjacent to the upstream side of the branch portion BP is set as the non-travelable section, the traveling vehicle control unit 76 additionally sets all the sections L adjacent to the downstream side of the pre-branch section BL as the non-travelable section. Specifically, when setting the section 11Bj, which is the pre-branch section BL adjacent to the upstream side of the branch portion BP, as the non-travelable section, the traveling vehicle control unit 76 additionally sets the section 11Bk and the section 11Bm, which are all sections L adjacent to the downstream side of the pre-branch section BL, as the non-travelable sections. The traveling vehicle control unit 76 also executes similar control for the section 11Af and the section 11Bg to be subjected to the pre-branch section BL.

[0045] Under the control of such a traveling vehicle control unit 76 in the inter-building conveyance route R5, for example, as shown in FIG. 6(B), when the worker inputs that the section 11Bf and the section 11Bj are sections in which traveling is prohibited via the input unit 71, or when the abnormality determination unit 75 determines that the section 11Bf and the section 11Bj are abnormal, the traveling vehicle control unit 76 sets the section 11Bf and the section 11Bj as non-travelable sections. In addition, the traveling vehicle control unit 76 additionally sets the section 11Bk and the section 11Bm as non-travelable sections automatically by setting the section 11Bj. In addition, the traveling

vehicle control unit 76 additionally sets the section 11Bg as the non-travelable section automatically by setting the section 11Bf as the non-travelable section and additionally setting the section 11Bk as the non-travelable section. When all sections or some sections are set as the non-travelable sections for all of the two second routes 11B, and thus the traveling vehicle 5 cannot move from the area A2 to the area A1, the traveling vehicle control unit 76 additionally sets all sections or some sections of only one first route 11A as the non-travelable sections. Therefore, the section 11Bg and the section 11Bm are additionally set as the non-travelable sections, and thus the section 11Ag is additionally set as the non-travelable section. Since the section 11AG becomes the non-travelable section, the traveling vehicle 5 cannot also move from the area A2 to the area A1. In the case of the layout of FIG. 6, when the section 11Bh and the section 11Bm are set or additionally set as the non-travelable sections, it is determined that the traveling vehicle 5 cannot move from the area A2 to the area A1.

[0046] As described above, in the control of the traveling vehicle control unit 76, even if all patterns of a combination of the non-travelable sections to be added when a part of the first route 11A or the second route 11B is set as the non-travelable section are not stored/determined, the non-travelable section is additionally set in conjunction with the preset additional setting pattern, whereby the non-travelable section to be added can be appropriately set even in a complicated layout.

[0047] The operational effects of the traveling vehicle system 1 of the above embodiment will be described. In the traveling vehicle system 1 of the above embodiment, when the traveling vehicle 5 cannot move to

the inside of the area A1, the traveling vehicle 5 is also prohibited from moving from the area A1 to the outside. Therefore, the number of traveling vehicles 5 present in the area A1 decreases, and it is possible to prevent the traveling vehicles 5 from concentrating on other areas A2 other than the area A1. In addition, in the traveling vehicle system 1 of the above embodiment, when the traveling vehicle 5 cannot move from the area A1 to the outside, the movement of the traveling vehicle 5 to the inside of the area A1 is also prohibited, so that it is possible to prevent the number of traveling vehicles 5 present in the area A1 from increasing and the traveling vehicle 5 from concentrating on the area A1. As a result, even when a section in which the traveling vehicle 5 cannot travel occurs, it is possible to prevent the deviation in the number of traveling vehicles 5 between the areas A1 and A2.

[0048] In the traveling vehicle system 1 of the above embodiment, the traveling vehicle control unit 76 determines the traveling route of the traveling vehicle 5 so that the traveling vehicle 5 does not enter the non-travelable section. As a result, since the traveling route is searched while avoiding the non-travelable section, it is possible to suppress occurrence of congestion caused by the non-travelable section.

[0049] In the traveling vehicle system 1 of the above embodiment, the traveling vehicle control unit 76 continues traveling of the traveling vehicle 5 in the area A1 and the area A2 even after the first route 11A and/or the second route 11B is set as the non-travelable section. As a result, even when the traveling vehicle 5 cannot move between the areas A1 and A2, the traveling vehicle 5 can move in the area A1 (A2).

[0050] In the traveling vehicle system 1 of the above embodiment, when

all the second routes 11B are set as the non-travelable sections, one first route 11A is additionally set as the non-travelable section. As a result, even when a plurality of second routes 11B are provided, it is possible to prevent the deviation in the number of traveling vehicles 5 between the areas A1 and A2.

[0051] Although one embodiment has been described above, one aspect of the present invention is not limited to the above embodiment. Various modifications can be made without departing from the gist of the invention.

[0052] In the above embodiment, an example has been described in which the traveling vehicle control unit 76 sets and additionally sets non-travelable sections in all sections or some sections of the first route 11A and in all sections or some sections of the second route 11B forming the movement route between the area A1 and the area A2, but the present invention is not limited thereto. For example, when the area A1, the area A2, and the area A3 including the circular track are formed, the traveling vehicle control unit 76 may set and additionally set the non-travelable sections in all sections or some sections of the route that can enter the area A1 and the route that can exit from the area A1, for example. Similarly, for example, the traveling vehicle control unit 76 may set and additionally set non-travelable sections in all sections or some sections of a route that can enter the area A2 and a route that can exit from the area A2, or may set and additionally set non-travelable sections in all sections or some sections of a route that can enter the area A3 and a route that can exit from the area A3.

[0053] In the above embodiment, a layout in which a first route 11A that

can enter from the area A2 and a second route 11B that can exit from the same area A2 are provided in the area A1, that is, a layout in which there are two routes between two areas has been described as an example, but the present invention is not limited thereto. For example, when there are
5 three areas illustrated in the upper part, a layout may be such that there is only one first route 11A that can enter the area A1, for example, from the area A2, and there is only one second route 11B that can exit from the area A1, for example, to the area A3.

[0054] In the embodiment and the modification described above, an
10 example has been described in which the deviation in the number of traveling vehicles 5 is eliminated between the area A1 and the area A2. However, the target area in which the deviation of the traveling vehicles 5 is eliminated may be not only the area A1 and the area A2 described above, but also a first loop L1 and a second loop L2 forming the turning
15 route R1 in the inter-building conveyance route R, for example, as illustrated in FIG. 4(A). That is, the present invention may be applied to eliminate the deviation in the number of traveling vehicles 5 between the first loop L1 and the second loop L2. In this case, the section 11Ac and the section 11Bc are the first route 11A and the second route 11B. When
20 one of the section 11Ac and the section 11Bc is set as the non-travelable section, the traveling vehicle control unit 76 additionally sets the other of the section 11Ac and the section 11Bc as the non-travelable section. As described above, the target area where the deviation in the number of traveling vehicles 5 is eliminated can be appropriately set.

25 [0055] In the embodiment and the modification described above, the example has been described in which the area A1 and the area A2 are

different buildings (Fab), and the first route 11A and the second route 11B are the inter-building conveyance route R. However, the present invention is not limited to this. The area A1 and the area A2 may be in the same building as long as the traveling vehicle 5 can circle around.

5 The arrangement, number, and distance of the first route 11A and the second route 11B connecting the area A1 and the area A2 are not particularly limited.

[0056] In the traveling vehicle system 1 of the above embodiment and modification, the overhead traveling vehicle 5 has been described as an

10 example of the traveling vehicle, but other examples of the traveling vehicle include an unmanned traveling vehicle and a stacker crane that travel on a track disposed on the ground or on a frame.

Reference Signs List

	[0057]	1	traveling vehicle system
15		5	traveling vehicle (overhead traveling vehicle)
		11	track
		11A	first route
		11B	second route
		50	traveling vehicle controller
20		70	system controller
		74	reception unit (information acquisition unit)
		75	abnormality determination unit (information acquisition unit)
		76	traveling vehicle control unit
25		90	placement part
		A1	area (second area)

	A2	area (first area)
	AL	post-merging section
	BL	pre-branch section
	BP	branch portion
5	CP	merging portion
	Fab1	first building
	Fab2	second building
	L	section
	P	nodal point
10	R, R3 R5	inter-building conveyance route
	R1	turning route

CLAIMS

[Claim 1] A traveling vehicle system, comprising:

a plurality of traveling vehicles;

5 a plurality of areas in which the traveling vehicle can circle
around in a one-way manner along a predetermined route;

a first route capable of entering a first area that is one of the
plurality of areas;

a second route capable of exiting from the first area;

10 an information acquisition unit configured to acquire information
on a section in which the traveling vehicle cannot travel; and

a traveling vehicle control unit configured to set a non-travelable
section based on the information acquired by the information acquisition
unit and control the traveling vehicle so as not to enter the non-travelable
section, wherein

15 the traveling vehicle control unit additionally sets at least a part
of one of the first route and the second route as the non-travelable section
when the traveling vehicle cannot enter or exit from the first area as a
result of setting at least a part of the other of the first route and the second
route as the non-travelable section, and causes the traveling vehicle not
20 to be able to exit from or enter the first area.

[Claim 2] The traveling vehicle system according to claim 1,
wherein

the first route is a route that connects the first area and a second
area different from the first area among the plurality of areas and is
25 movable from the second area to the first area, and

the second route is a route that connects the first area and the

second area and is movable from the first area to the second area.

[Claim 3] The traveling vehicle system according to claim 1 or 2,
wherein the traveling vehicle control unit determines a traveling route of
the traveling vehicle so that the traveling vehicle does not enter the non-
travelable section.

[Claim 4] The traveling vehicle system according to claim 1 or 2,
wherein the traveling vehicle control unit continues traveling of the
traveling vehicle in the first area even after the first route and/or the
second route is set as the non-travelable section.

[Claim 5] The traveling vehicle system according to claim 1 or 2,
wherein

when a plurality of the first routes are provided and one or a
plurality of the second routes are provided, even if at least a part of the
first route is set as the non-travelable section, the traveling vehicle
control unit does not additionally set the second route as the non-
travelable section as long as the traveling vehicle can enter the first area,
and continues a state in which the traveling vehicle can exit from the first
area, and

when a plurality of the second routes are provided and one or a
plurality of the first routes are provided, even if at least a part of the
second route is set as the non-travelable section, the traveling vehicle
control unit does not additionally set the first route as the non-travelable
section as long as the traveling vehicle can exit from the first area, and
continues a state in which the traveling vehicle can enter the first area.

[Claim 6] The traveling vehicle system according to claim 5,
wherein

when a merging portion of the first route, a branch portion of the first route, a merging portion of the second route, and a branch portion of the second route are defined as nodal points, and a route interposed between the nodal points is defined as the section,

5 the traveling vehicle control unit,

when all the sections adjacent to an upstream side of the post-merging section adjacent to a downstream side of the merging portion are set as the non-travelable section, additionally sets the post-merging section as the non-travelable section, and when the pre-branching section
10 adjacent to an upstream side of the branch portion is set as the non-travelable section, additionally sets all the sections adjacent to a downstream side of the pre-branching section as the non-travelable section.