

DESCRIPTION

Title of Invention

BRANCHING DEVICE, AND CENTER GUIDE-
TYPE GUIDEWAY TRANSPORTATION SYSTEM

Technical Field

[0001]

The present disclosure relates to a branching device and a center guide-type guideway transportation system.

Priority is claimed on Japanese Patent Application No. 2021-087746, filed May 25, 2021, the content of which is incorporated herein by reference.

Background Art

[0002]

As new transportation means other than buses and railways, a guideway transportation system that runs on a track by running wheels mounted with rubber tires is known. The guideway transportation system includes a center guide-type guideway transportation system in which a guide wheel is disposed in the center of a vehicle. In such a center guide-type guideway transportation system, a turnout switch area for branching the track into two tracks is formed. A branching device that moves a guide guiding the vehicle is disposed, in this turnout switch area. Examples of the

branching device applied to the center guide-type guideway transportation system include a device disclosed in PTL 1 below.

[0003]

In PTL 1, a branching device equipped with a main line movable rail and a turnout switch line movable rail that rotate between a guide position and a retract position, with respect to a fixed rail that is a guide disposed in the center of the running path in the width direction is described. In this branching device, when the main line movable rail is disposed at the guide position and the turnout switch line movable rail is disposed at the retract position, the vehicle travels straight and is guided to the main line running path. On the other hand, when the main line movable rail is disposed at the retract position and the turnout switch line movable rail is disposed at the guide position, the vehicle is guided to the turnout switch running path that is branched from the main line running path.

Citation List

Patent Literature

[0004]

[PTL 1] Japanese Patent No. 5693294

Summary of Invention

Technical Problem

[0005]

However, in the structure as described above, there is a possibility that the main line movable rail and the turnout switch line movable rail, which are movable guides, become very long, depending on the shape of the turnout switch area. As a result, when the movable guides become long, a large space is required for the turnout switch area, in order to move the movable guide so as not to interfere with the running of the vehicle.

[0006]

The present disclosure provides a branching device and a center guide-type guideway transportation system capable of reducing a space for a turnout switch area regardless of the shape of the turnout switch area.

Solution to Problem

[0007]

A branching device according to the present disclosure is a branching device disposed in a turnout switch area between a main line track and a turnout switch guideway, the branching device including: a first main line movable guide and a second main line movable guide that are movable between a main line guide position where a vehicle is able to be guided from a first main line guideway to a second main line guideway, and a main line retract position where the vehicle is not able to be guided from the first main

line guideway to the second main line guideway; a first turnout switch movable guide and a second turnout switch movable guide that are movable between a turnout switch guide position where the vehicle is able to be guided from the first main line guideway to the turnout switch guideway, and a turnout switch retract position where the vehicle is not able to be guided from the first main line guideway to the turnout switch guideway; and a movable device that moves the first main line movable guide, the second main line movable guide, the first turnout switch movable guide, and the second turnout switch movable guide.

[0008]

A center guide-type guideway transportation system according to the present disclosure includes the branching device; the main line track that has a main line running path having a running surface contactable with the running wheels of the vehicle and extending in a first direction, and a main line guide disposed on a first virtual center line positioned at a center of the main line running path in a width direction to guide the vehicle; and the turnout switch guideway that has a turnout switch running path extending in a second direction different from the first direction and having the running surface so as to turnout off from the main line running path, and a turnout switch guide disposed on a second virtual center line positioned

at a center of the turnout switch running path in the width direction to guide the vehicle.

Advantageous Effects of Invention

[0009]

According to the branching device and the center guide-type guideway transportation system of the present disclosure, a space for a turnout switch area can be reduced regardless of the shape of the turnout switch area.

Brief Description of Drawings

[0010]

Fig. 1 is a plan view illustrating a configuration of a center guide-type guideway transportation system according to a first embodiment.

Fig. 2 is a plan view illustrating a state when a vehicle runs on a main line track in the center guide-type guideway transportation system according to the present embodiment.

Fig. 3 is a cross-sectional view taken along line III-III of Fig. 2.

Fig. 4 is a plan view illustrating a state when the vehicle runs on a turnout switch guideway in the center guide-type guideway transportation system according to the present embodiment.

Fig. 5 is a cross-sectional view taken along line V-V of Fig. 4.

Fig. 6 is a plan view illustrating a configuration of a center guide-type guideway transportation system according to a second embodiment.

Fig. 7 is a plan view illustrating a configuration of a center guide-type guideway transportation system according to a third embodiment.

Description of Embodiments

[0011]

<First Embodiment>

Hereinafter, a first embodiment, which is one of embodiments for implementing a center guide-type guideway transportation system 1 according to the present disclosure, will be described with reference to the accompanying drawings. However, the present disclosure is not limited to this first embodiment.

[0012]

(Configuration of guideway transportation system)

The center guide-type guideway transportation system 1 of the embodiment of the present disclosure is a system in which a center-guided vehicle 100 runs along a track 10.

[0013]

(Configuration of Vehicle 100)

As shown in Fig. 1, the vehicle 100 running on the track 10 in the embodiment of the present disclosure is the vehicle 100 of a new traffic system of a guide rail type.

The vehicle 100 operates, with one or more vehicles as one train. In a case where a plurality of vehicles 100 form one train, the vehicles 100 are connected to each other by a connecting device (not shown). Each vehicle 100 includes a car body 101, running wheels 102, guide wheels 103, and power collectors 104.

[0014]

A plurality of running wheels 102 are disposed below the car body 101. The running wheels 102 are made of rubber tires and are rotationally driven by an electric motor (not shown). The vehicle 100 runs along a guide 12 described later while steering the running wheels 102 with respect to the running path 11 on the guideway 10.

[0015]

As shown in Fig. 3, a plurality of guide wheels 103 are disposed below the car body 101. The outer peripheral portion of the guide wheel 103 is formed of an elastic member such as urethane rubber. A pair of guide wheels 103 of the present embodiment is disposed at the center of the car body 101 in the vehicle width direction so as to interpose the rail-shaped guide 12 described later. The guide wheels 103 are disposed below the center of the car body 101 so as to be interposed between the pair of running wheels 102 in the vehicle width direction. Two sets of the pair of guide wheels 103 are disposed apart from each other

in the front and the rear with respect to one car body 101.

[0016]

As shown in Fig. 1, the power collectors 104 come into contact with a power rail 13 described later to supply power to the electric motor that rotates the running wheels 102. A pair of power collectors 104 of the present embodiment are disposed on the outer side of the car body 101 in the vehicle width direction. Two sets of power collectors 104 are disposed apart from each other, for example, in the front and the rear with respect to one car body 101.

[0017]

In the center guide-type guideway transportation system 1, a guide 12 for guiding the vehicle 100 is disposed at the center of a running path 11 on which the vehicle 100 runs. The center guide-type guideway transportation system 1 of the first embodiment mainly includes a guideway 10 and a branching device 4.

[0018]

(Guideway Configuration)

The vehicle 100 can run on the guideway 10. The guideway 10 extends along a predetermined line. The running path 11 on which the vehicle 100 runs is formed on the guideway 10. The running path 11 extends in the extending direction De. Here, the extending direction De is a direction that intersects (or orthogonal in the present

embodiment) the vertical direction D_v (see Fig. 3), and is a direction in which the guideway 10 extends. A running surface 11a is formed on each running path 11. The running surface 11a is a flat surface with which the running wheels 102 can come into contact while rolling, when the vehicle 100 runs on the running path 11. Therefore, a pair of running surfaces 11a are formed with an interval in the width direction D_w intersecting (or orthogonal in the present embodiment) the extending direction D_e and the vertical direction D_v so as to correspond to the positions of the pair of running wheels 102 of the vehicle 100. The running surface 11a is formed into a flat surface over the entire surface such that the running wheels 102 mounted with rubber tires of the vehicle 100 can roll. The running wheels 102 roll on the running surface 11a, so that the vehicle 100 runs on the running path 11.

[0019]

The running surfaces 11a of the present embodiment are not actually formed apart in the width direction D_w , but are connected in the width direction D_w to be integrally formed as a part of the flat upper surface of the running path 11 over the left and right sides. Therefore, the running surface 11a in the present embodiment is a region with which the running wheels 102 are assumed to come into contact, in the upper surface of the running path 11 facing

upward in the vertical direction D_v , when the vehicle 100 runs on the running path 11. Further, the surface of the running surface 11a is subjected to grooving, roughening, or the like to the extent that the flatness is not impaired. Thus, the surface of the running surface 11a is a surface that secures a friction coefficient with the tire tread during rainfall or the like and prevents slipping.

[0020]

As shown in Fig. 1, the guideway 10 of the present embodiment further includes a guide 12 for guiding the vehicle 100, and a power rail 13 for supplying electricity to the vehicle 100.

[0021]

The guide 12 is contactable with the guide wheels 103, and guides the running direction of the vehicle 100 so as to move along the running path 11. The guide 12 extends in the extending direction D_e over the total extension of the guideway 10. The guide 12 is a rail-shaped member made of H-shaped steel or I-shaped steel. The guide 12 is disposed at a central portion in the width direction D_w with respect to a surface (upper surface of the running path 11) along the running surface 11a. The guide 12 extends from the upper surface of the running path 11 at the same height in the extending direction D_e . That is, the guide 12 is disposed in a state of protruding upward in the vertical

direction Dv with respect to the running surface 11a.

[0022]

The power rail 13 comes into contact with the power collectors 104 of the vehicle 100 to supply power to the vehicle 100. The power rail 13 extends in the extending direction De. The power rails 13 are disposed on the outer side of the running surfaces 11a in the width direction Dw. The power rail 13 extends from the upper surface of the running path 11 at the same height in the extending direction De at a higher position than the guide 12 in the vertical direction Dv. In addition, depending on the type of the power supply, two power rails 13 are disposed in the case of a direct power supply and three lines are disposed in the case of an alternating power supply.

[0023]

In addition, the guideway 10 of the present embodiment includes a main line guideway 2 and a turnout switch guideway 3 branched from the main line guideway 2. Here, among the extending directions De, the extending direction of the main line guideway 2 is referred to as a first direction D1, and the extending direction of the turnout switch guideway 3 is referred to as a second direction D2. The second direction D2 is a direction that intersects the first direction D1 on a virtual plane parallel to the running surface 11a. Further, since the width direction Dw

is a direction orthogonal to the extending direction De, the main line guideway 2 and the turnout switch guideway 3 are in different directions.

[0024]

In the following, a region where turnout from the main line guideway 2 to the turnout switch guideway 3 starts will be referred to as a turnout switch area A. In the turnout switch area A, a part of the main line guideway 2 and a part of the turnout switch guideway 3 overlap each other. The branching device 4 is disposed in the turnout switch area A. Further, in the turnout switch area A of the present embodiment, only one of the turnout switch guideways 3 extending in different directions is connected to the main line guideway 2.

[0025]

Here, a front side (a side in which the vehicle 100 is disposed in Fig. 1) in a running direction of the vehicle 100 passing on the main line guideway 2 with respect to the turnout switch area A is referred to as a first side in the first direction D1. Further, a forward side (a side in which the vehicle 100 is not disposed in Fig. 1) in a running direction of the vehicle 100 passing on the main line guideway 2 with respect to the turnout switch area A is referred to as a second side in the first direction D1. The main line guideway 2 has a first main line guideway 2A

disposed on the first side of the first direction D1 with respect to the turnout switch area A, and a second main line guideway 2B disposed on the second side of the first direction D1 which is opposite to the first main line guideway 2A with respect to the turnout switch area A. Further, a front side (a side in which the first main line guideway 2A is disposed with respect to the turnout switch guideway 3 in Fig. 1) in a running direction of the vehicle 100 from the first main line guideway 2A toward the turnout switch guideway 3 with respect to the turnout switch area A is referred to as a first side in the second direction D2. A forward side (a side in which the turnout switch guideway 3 is disposed with respect to the first main line guideway 2A in Fig. 1) in a running direction of the vehicle 100 from the first main line guideway 2A toward the turnout switch guideway 3 with respect to the turnout switch area A is referred to as a second side in the second direction D2.

[0026]

(Main Line Guideway Configuration)

The main line guideway 2 has a main line running path 21 which is a part of the running path 11, a main line guide 22 which is a part of the guide 12, and a main line power rail 23 which is a part of the train line 13. Therefore, the first main line guideway 2A and the second main line guideway 2B each have the main line running path 21, the

main line guide 22, and the main line power rail 23.

[0027]

The main line running path 21 extends in the first direction D1 and allows the vehicle 100 to run. The main line running path 21 has a running surface 11a with which the running wheels 102 of the vehicle 100 come into contact while rolling. The upper surfaces of the main line running path 21 are formed so as to be connected in the width direction Dw, and are integrally formed over the left and right sides. Therefore, a part of the upper surface of the main line running path 21 forms the running surface 11a.

[0028]

The main line guide 22 guides the running direction of the vehicle 100 so as to move along the main line running path 21 by contact with the guide wheels 103. The main line guide 22 is disposed on the first virtual center line 01 located at the center of the main line running path 21 in the width direction Dw. The first virtual center line 01 is a virtual line indicating the center of the main line running path 21 in the width direction Dw interposed between the running surfaces 11a of the main line running path 21 and extends in the first direction D1. Therefore, the first virtual center line 01 extends so as not to overlap the running surface 11a of the main line running path 21.

[0029]

The main line power rail 23 extends in a first direction D1. The main line power rails 23 are disposed on the outer side of the main line running path 21 in the width direction Dw. That is, the main lines power rails 23 are respectively disposed on the left and right sides in the running direction of the vehicle 100 when the vehicle 100 travels from the first main line guideway 2A to the second main line guideway 2B. In a case where the vehicle 100 travels from the first main line guideway 2A to the second main line guideway 2B, the main line power rail 23 disposed on the right side (the side on which the turnout switch guideway 3 is disposed) with respect to the vehicle 100 is disposed on the first side of the first direction D1 in the turnout switch area A and is not disposed on the second side. In a case where the vehicle 100 travels from the first main line guideway 2A to the second main line guideway 2B, the main line power rail 23 disposed on the left side (the side on which the turnout switch guideway 3 is not disposed) with respect to the vehicle 100 extends in the first direction D1 without interruption in the turnout switch area A. The main line power rail 23 extends from the upper surface of the main line running path 21 at the same height in the extending direction De at a higher position than the main line guide 22 in the vertical direction Dv.

[0030]

(Turnout Switch Guideway Configuration)

The turnout switch guideway 3 has a turnout switch running path 31 which is a part of the running path 11, a turnout switch guide 32 which is a part of the guide 12, and a turnout switch power rail 33 which is a part of the power rail 13.

[0031]

The turnout switch running path 31 extends in the second direction D2 from the middle of the main line running path 21 so as to turnout from the main line running path 21. The turnout switch running path 31 is connected to the main line running path 21 while being curved in the turnout switch area A. The turnout switch running path 31 has a running surface 11a with which the running wheels 102 of the vehicle 100 come into contact while rolling. The upper surfaces of the turnout switch running path 31 are formed so as to be connected in the width direction Dw, and are integrally formed over the left and right sides. Therefore, a part of the upper surface of the turnout switch running path 31 forms the running surface 11a.

[0032]

The turnout switch guide 32 guides the running direction of the vehicle 100 so as to move along the turnout switch running path 31 by contact with the guide wheels 103. The turnout switch guide 32 is disposed on the second

virtual center line 02 located at the center of the turnout switch running path 31 in the width direction Dw. The second virtual center line 02 is a virtual line indicating the center of the turnout switch running path 31 in the width direction Dw interposed between the running surfaces 11a of the turnout switch running path 31 and extends in the second direction D2. Therefore, the second virtual center line 02 extends so as not to overlap the running surface 11a of the turnout switch running path 31. The turnout switch guide 32 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22.

[0033]

The turnout switch power rail 33 extends in a second direction D2. The turnout switch power rail 33 is disposed on the outer side of the turnout switch running path 31 in the width direction Dw. That is, the turnout switch power rail 33 are respectively disposed on the left and right sides in the running direction of the vehicle 100 when the vehicle 100 travels from the first main line guideway 2A to the turnout switch guideway 3. In a case where the vehicle 100 travels from the first main line guideway 2A to the turnout switch guideway 3, the turnout switch power rail 33 disposed on the right side (the side where the second main line guideway 2B is not disposed) with respect to the vehicle 100 is connected to the main line power rail 23

without interruption in the turnout switch area A. In a case where the vehicle 100 travels from the first main line guideway 2A to the turnout switch guideway 3, the turnout switch power rail 33 is not disposed on the left side (the side on which the second main line guideway 2B is disposed) with respect to the vehicle 100. The turnout switch power rail 33 extends from the upper surface of the turnout switch running path 31 at the same height in the extending direction De at a higher position than the turnout switch guide 32 in the vertical direction Dv.

[0034]

(Configuration of branching device)

The branching device 4 is a device that switches the guideway 10 on which the vehicle 100 travels, between the main line guideway 2 and the turnout switch guideway 3. Therefore, for example, the branching device 4 guides the vehicle 100 running on the first main line guideway 2A to the second main line guideway 2B or the turnout switch guideway 3. Here, a state in which the branching device 4 is switched so as to guide the vehicle 100 running on the first main line guideway 2A to the second main line guideway 2B is referred to as a first state. Further, a state in which the branching device 4 is switched so as to guide the vehicle 100 running on the first main line guideway 2A to the turnout switch guideway 3 is referred to as a second

state. The branching device 4 of the present embodiment includes a first main line movable guide 41, a second main line movable guide 42, a main line fixing guide 43, a first turnout switch movable guide 51, a second turnout switch movable guide 52, a turnout switch fixing guide 53, and a movable device 6. The first main line movable guide 41, the second main line movable guide 42, the main line fixing guide 43, the first turnout switch movable guide 51, the second turnout switch movable guide 52, and the turnout switch fixing guide 53 are a part of the guide 12 in the turnout switch area A.

[0035]

The first main line movable guide 41, together with the second main line movable guide 42, guides the vehicle 100 traveling on the main line guideway 2 in the turnout switch area A. The first main line movable guide 41 and the second main line movable guide 42 are movable between a main line guide position where the vehicle 100 is able to be guided from the first main line guideway 2A to the second main line guideway 2B, and a main line retract position where the vehicle 100 is not able to be guided from the first main line guideway 2A to the second main line guideway 2B. The main line guide position is a position with which the guide wheels 103 of the passing vehicle 100 can contact, and is a position where the vehicle 100 is guided to the

second main line guideway 2B. The main line retract position is a position with which the guide wheels 103 of the passing vehicle 100 cannot contact. The first main line movable guide 41 is disposed in the turnout switch area A. The first main line movable guide 41 is disposed at a position closer to the first main line guideway 2A than the second main line movable guide 42 in the first direction D1, when viewed from above in the vertical direction Dv. The first main line movable guide 41 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The first main line movable guide 41 is rotatably supported with respect to the running surface 11a. Specifically, the first main line movable guide 41 of the present embodiment is capable of rotating around a rotation axis disposed at one end portion that is a base end. Here, the one end portion (first end portion) of the first main line movable guide 41 is an end portion on the first side in the first direction D1. Further, the other end portion (second end portion) of the first main line movable guide 41 is an end portion on the opposite side to the one end portion, and is an end portion on the second side in the first direction D1. One end portion of the first main line movable guide 41 is disposed at a position overlapping the first virtual center line 01 when viewed from above in the vertical direction Dv. Therefore, the first main line

movable guide 41 is rotatable with one end portion on the first virtual center line 01 as a rotation center so as to move the other end portion, between the main line guide position and the main line retract position. In the present embodiment, the other end portion, which is the tip of the first main line movable guide 41, moves clockwise away from the turnout switch guideway 3 with respect to the first virtual center line 01, when moving from the main line guide position to the main line retract position. As shown in Figs. 2 and 3, at the main line guide position, the other end portion of the first main line movable guide 41 is disposed on the first virtual center line 01. Thus, at the main line guide position, the first main line movable guide 41 is extended straight on the first virtual center line 01, when viewed from the vertical direction Dv. At the main line guide position, the other end portion of the first main line movable guide 41 is in contact with the end portion of the main line guide 22 of the first main line guideway 2A in the width direction Dw. Further, as shown in Figs. 4 and 5, at the main line retract position, the other end portion of the first main line movable guide 41 is disposed at a position deviated from the first virtual center line 01 and a position deviated from the running surface 11a of the turnout switch running path 31. In the present embodiment, the other end portion of the first main line

movable guide 41 is disposed at a position deviated from the running surface 11a of the main line running path 21, at the main line retract position. Thus, at the main line retract position, the first main line movable guide 41 is inclined with respect to the first virtual center line 01, when viewed from the vertical direction Dv.

[0036]

As shown in Fig. 1, the second main line movable guide 42 is disposed at a position away from the first main line movable guide 41 in the turnout switch area A. The second main line movable guide 42 is disposed at a position closer to the second main line guideway 2B than the first main line movable guide 41 in the first direction D1, when viewed from above in the vertical direction Dv. The second main line movable guide 42 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The second main line movable guide 42 is rotatably supported with respect to the running surface 11a. Specifically, similarly to the first main line movable guide 41, the second main line movable guide 42 of the present embodiment is capable of rotating around a rotation axis disposed at one end portion that is a base end. Here, the one end portion (first end portion) of the second main line movable guide 42 is an end portion on the first side in the first direction D1. Further, the other end portion (second end portion) of

the second main line movable guide 42 is an end portion on the opposite side to the one end portion, and is an end portion on the second side in the first direction D1. One end portion of the second main line movable guide 42 is disposed at a position overlapping the first virtual center line 01 when viewed from above in the vertical direction Dv. One end portion of the second main line movable guide 42 is disposed at a position adjacent to the end portion of the main line guide 22 of the second main line guideway 2B in the first direction D1 when viewed from above in the vertical direction Dv. Therefore, the second main line movable guide 42 is rotatable with one end portion on the first virtual center line 01 as a rotation center so as to move the other end portion, between the main line guide position and the main line retract position. In the present embodiment, the other end portion, which is the tip of the second main line movable guide 42, moves clockwise away from the turnout switch guideway 3 with respect to the first virtual center line 01, when moving from the main line guide position to the main line retract position. As shown in Fig. 2, at the main line guide position, the other end portion of the second main line movable guide 42 is disposed on the first virtual center line 01. Thus, at the main line guide position, the second main line movable guide 42 is extended straight on the first virtual center line 01, when

viewed from the vertical direction Dv. Further, as shown in Fig. 4, in the main line retract position, the other end portion of the second main line movable guide 42 is disposed at a position deviated from the first virtual center line 01 and a position deviated from the running surface 11a of the turnout switch running path 31. In the present embodiment, the other end portion of the second main line movable guide 42 is disposed at a position deviated from the running surface 11a of the turnout switch running path 31 at the main line retract position. Thus, at the main line retract position, the second main line movable guide 42 is inclined with respect to the first virtual center line 01, when viewed from the vertical direction Dv.

[0037]

As shown in Fig. 1, the main line fixing guide 43, together with the first main line movable guide 41 and the second main line movable guide 42, guides the vehicle 100 traveling on the main line guideway 2 in the turnout switch area A. The main line fixing guide 43 is disposed in the turnout switch area A in a non-movable state. That is, the main line fixing guide 43 is fixed to the main line running path 21. The main line fixing guide 43 is disposed between the first main line movable guide 41 and the second main line movable guide 42 in the first direction D1. The main line fixing guide 43 is disposed at a position deviated from

the running surface 11a of the turnout switch running path 31. The main line fixing guide 43 is formed in a linear shape so as to extend on the first virtual center line 01. The main line fixing guide 43 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The main line fixing guide 43 is shorter than the first main line movable guide 41 and the second main line movable guide 42. The main line fixing guide 43 can come into contact with at least one of the first main line movable guide 41 or the second main line movable guide 42, in a state where the first main line movable guide 41 and the second main line movable guide 42 are positioned at the main line guide positions. One end portion of the main line fixing guide 43 of the present embodiment is disposed at a position where the main line fixing guide 43 comes into contact with the other end portion of the second main line movable guide 42 in the width direction Dw, in a state where the second main line movable guide 42 is positioned at the main line guide position. The other end portion of the main line fixing guide 43 is adjacent to one end portion of the first main line movable guide 41 in the first direction D1.

[0038]

The first turnout switch movable guide 51, together with the second turnout switch movable guide 52, guides the vehicle 100 traveling on the turnout switch guideway 3 in

the turnout switch area A. The first turnout switch movable guide 51, together with the second turnout switch movable guide 52, is movable between a turnout switch guide position where the vehicle 100 is able to be guided from the first main line guideway 2A to the turnout switch guideway 3 and a turnout switch retract position where the vehicle 100 is not able to be guided from the first main line guideway 2A to the turnout switch guideway 3. The turnout switch guide position is a position with which the guide wheels 103 of the passing vehicle 100 can contact, and is a position where the vehicle 100 is guided to the turnout switch guideway 3. The turnout switch retract position is a position with which the guide wheels 103 of the passing vehicle 100 cannot contact. The first turnout switch movable guide 51 is disposed in the turnout switch area A. The first turnout switch movable guide 51 is disposed at a position closer to the first main line guideway 2A than the second turnout switch movable guide 52 in the second direction D2, when viewed from above in the vertical direction Dv. The first turnout switch movable guide 51 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The first turnout switch movable guide 51 is rotatably supported with respect to the running surface 11a. Specifically, the first turnout switch movable guide 51 of the present embodiment is capable of rotating around a

rotation axis disposed at one end portion that is a base end. Here, the one end portion (first end portion) of the first turnout switch movable guide 51 is an end portion on the first side in the second direction D2. Further, the other end portion (second end portion) of the first turnout switch movable guide 51 is an end portion on the opposite side to the one end portion, and is an end portion on the second side in the second direction D2. One end portion of the first turnout switch movable guide 51 is disposed at a position overlapping the second virtual center line 02 when viewed from above in the vertical direction Dv. In addition, one end portion of the first turnout switch movable guide 51 is disposed at a position deviated from both the running surface 11a of the main line running path 21 and the running surface 11a of the turnout switch running path 31 when viewed from above in the vertical direction Dv. The first turnout switch movable guide 51 is rotatable with one end portion on the second virtual center line 02 as a rotation center so as to move the other end portion, between the turnout switch guide position and the turnout switch retract position. In the present embodiment, the other end portion, which is the tip of the first turnout switch movable guide 51, moves counterclockwise away from the first virtual center line 01, when moving from the turnout switch guide position to the turnout switch retract position. As shown

in Figs. 4 and 5, at the turnout switch guide position, the other end portion of the first turnout switch movable guide 51 is disposed on the first virtual center line 01 and the second virtual center line 02. Thus, at the turnout switch guide position, the first turnout switch movable guide 51 is curved and extended on the second virtual center line 02, when viewed from the vertical direction Dv. At the turnout switch guide position, the other end portion of the first turnout switch movable guide 51 is in contact with the end portion of the main line guide 22 of the first main line guideway 2A in the width direction Dw. Further, as shown in Figs. 2 and 3, at the turnout switch retract position, the other end portion of the first turnout switch movable guide 51 is disposed at a position deviated from the first virtual center line 01 and the second virtual center line 02. In the present embodiment, the other end portion of the first turnout switch movable guide 51 is disposed at a position deviated from the running surface 11a of the main line running path 21 and the running surface 11a of the turnout switch running path 31, at the turnout switch retract position. Thus, at the turnout switch retract position, the first turnout switch movable guide 51 is inclined with respect to the second virtual center line 02, when viewed from the vertical direction Dv.

[0039]

As shown in Fig. 1, the second turnout switch movable guide 52 is disposed at a position away from the first turnout switch movable guide 51 in the turnout switch area A. The second turnout switch movable guide 52 is disposed at a position closer to the turnout switch guideway 3 than the first turnout switch movable guide 51 in the second direction D2, when viewed from above in the vertical direction Dv. The second turnout switch movable guide 52 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The second turnout switch movable guide 52 is rotatably supported with respect to the running surface 11a. Specifically, similarly to the first turnout switch movable guide 51, the second turnout switch movable guide 52 of the present embodiment is capable of rotating around a rotation axis disposed at one end portion that is a base end. Here, the one end portion (first end portion) of the second turnout switch movable guide 52 is an end portion on the first side in the second direction D2. Further, the other end portion (second end portion) of the second turnout switch movable guide 52 is an end portion on the opposite side to the one end portion, and is an end portion on the second side in the second direction D2. One end portion of the second turnout switch movable guide 52 is disposed at a position overlapping the second virtual center line 02 when viewed from above in the vertical

direction Dv. One end portion of the second turnout switch movable guide 52 is disposed at a position adjacent to the end portion of the turnout switch guide 32 of the turnout switch guideway 3 in the second direction D2 when viewed from above in the vertical direction Dv. Therefore, the second turnout switch movable guide 52 is rotatable with one end portion on the second virtual center line 02 as a rotation center so as to move the other end portion, between the turnout switch guide position and the turnout switch retract position. In the present embodiment, the other end portion of the second turnout switch movable guide 52 moves counterclockwise away from the first virtual center line 01 with respect to the second virtual center line 02, when moving from the turnout switch guide position to the retract position. As shown in Fig. 4, at the turnout switch guide position, the other end portion of the second turnout switch movable guide 52 is disposed on the second virtual center line 02. Thus, at the turnout switch guide position, the second turnout switch movable guide 52 is extended on the second virtual center line 02, when viewed from the vertical direction Dv. Further, as shown in Fig. 2, at the turnout switch retract position, the other end portion of the second turnout switch movable guide 52 is disposed at a position deviated from the second virtual center line 02 and a position deviated from the running surface 11a of the

turnout switch running path 31. In the present embodiment, the other end portion, which is the tip of the second turnout switch movable guide 52, is disposed at a position deviated from the running surface 11a of the main line running path 21, at the turnout switch retract position. Thus, at the turnout switch retract position, the second turnout switch movable guide 52 is inclined with respect to the second virtual center line 02, when viewed from the vertical direction Dv.

[0040]

As shown in Fig. 1, the turnout switch fixing guide 53, together with the first turnout switch movable guide 51 and the second turnout switch movable guide 52, guides the vehicle 100 traveling on the turnout switch guideway 3 in the turnout switch area A. The turnout switch fixing guide 53 is disposed in the turnout switch area A in a non-movable state. The turnout switch fixing guide 53 of the present embodiment is fixed to the turnout switch running path 31. The turnout switch fixing guide 53 is disposed between the first turnout switch movable guide 51 and the second turnout switch movable guide 52 in the second direction D2. The turnout switch fixing guide 53 is disposed at a position deviated from the running surface 11a of the main line running path 21. The turnout switch fixing guide 53 is formed to be curved so as to extend on the second virtual

center line 02. The turnout switch fixing guide 53 is a rail-shaped member formed in the same cross-sectional shape as the main line guide 22. The turnout switch fixing guide 53 is shorter than the first turnout switch movable guide 51 and the second turnout switch movable guide 52. The turnout switch fixing guide 53 can come into contact with at least one of the first turnout switch movable guide 51 or the second turnout switch movable guide 52, in a state where the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are positioned at the turnout switch guide positions. One end portion of the turnout switch fixing guide 53 of the present embodiment is disposed at a position where the turnout switch fixing guide 53 comes into contact with the other end portion of the second turnout switch movable guide 52 in the width direction D_w , in a state where the second turnout switch movable guide 52 is positioned at the turnout switch line guide position. The other end portion of the turnout switch fixing guide 53 is adjacent to one end portion of the first turnout switch movable guide 51 in the second direction D_2 .

[0041]

The movable device 6 moves the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52. The movable device 6 moves the

first main line movable guide 41 and the second main line movable guide 42 between the main line guide position and the main line retract position. The movable device 6 moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 between the turnout switch guide position and the turnout switch retract position. The movable device 6 is capable of temporarily fixing the positions of the first main line movable guide 41 and the second main line movable guide 42 at the main line guide position and the main line retract position, respectively. The movable device 6 is capable of temporarily fixing the positions of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 at the turnout switch guide position and the turnout switch retract position, respectively. The movable device 6 of the present embodiment simultaneously moves the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52. Specifically, as the first state, the movable device 6 simultaneously moves the first main line movable guide 41 and the second main line movable guide 42 from the main line retract position to the main line guide position, and simultaneously moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch guide position to

the turnout switch retract position. Further, as the second state, the movable device 6 simultaneously moves the first main line movable guide 41 and the second main line movable guide 42 from the main line guide position to the main line retract position, and simultaneously moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch retract position to the turnout switch guide position. The movable device 6 of the present embodiment has a lever body 60, a first rod 61, a second rod 62, and a lever drive unit 7.

[0042]

The lever body 60 rotates around one end to simultaneously move the first rod 61 and the second rod 62. The lever body 60 is a rod-shaped member extending in the first direction D1. The lever body 60 of the present embodiment is disposed on the outer side of the main line guideway 2 opposite to the position where the turnout switch guideway 3 extends in the width direction Dw. The lever body 60 extends parallel to the main line guide 22. One end of the lever body 60 is rotatably supported with respect to the main line guideway 2. Therefore, the lever body 60 is supported such that a tip thereof moves around one end thereof. One end of the lever body 60 is disposed on the outer side of the first main line guideway 2A in the width direction Dw.

[0043]

The first rod 61 connects the first main line movable guide 41 and the first turnout switch movable guide 51 to the lever body 60. Specifically, the first rod 61 of the present embodiment is a rod-shaped member extending in the width direction Dw. As shown in Fig. 3, the first rod 61 is disposed in a groove formed below the running surface 11a. As shown in Fig. 1, one end portion of the first rod 61 is rotatably connected to the vicinity of the middle portion of the lever body 60 in the first direction D1. The other end portion of the first rod 61 is rotatably connected to the other end portion of the first turnout switch movable guide 51. The intermediate portion of the first rod 61 is rotatably connected to the other end portion of the first main line movable guide 41. Thus, the first rod 61 moves the other end portion of the first main line movable guide 41 and the other end portion of the first turnout switch movable guide 51 so as to follow the movement of the lever body 60. That is, the first rod 61 simultaneously rotates the first main line movable guide 41 and the first turnout switch movable guide 51 as the lever body 60 rotates.

[0044]

The second rod 62 connects the second main line movable guide 42 and the second turnout switch movable guide 52 to the lever body 60. Specifically, the second rod 62 of the

present embodiment is a rod-shaped member extending in the width direction Dw. The second rod 62 is disposed in the groove formed below the running surface 11a, similarly to the first rod 61. The second rod 62 is disposed on the second side, which is a position closer to the second main line guideway 2B than the first rod 61 in the first direction D1. One end portion of the second rod 62 is rotatably connected to the tip of the lever body 60. The tip of the lever body 60 is an end portion opposite to one end of the rotatably supported lever body 60 in the first direction D1. The other end portion of the second rod 62 is rotatably connected to the other end portion of the second turnout switch movable guide 52. The intermediate portion of the second rod 62 is rotatably connected to the other end portion of the second main line movable guide 42. Thus, the second rod 62 moves the other end portion of the second main line movable guide 42 and the other end portion of the second turnout switch movable guide 52 so as to follow the movement of the lever body 60. That is, the second rod 62 simultaneously rotates the second main line movable guide 42 portion and the second turnout switch movable guide 52 as the lever body 60 rotates.

[0045]

The lever drive unit 7 presses the lever body 60 in a direction intersecting the first direction D1 to rotate the

lever body 60. The lever drive unit 7 of the present embodiment moves the lever body 60 so as to rotate between a first position and a second position deviated from the first position. At the first position, the lever body 60 is parallel to the main line guide 22. In addition, at the first position, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 enter the first state. At the second position, the lever body 60 is inclined with respect to the main line guide 22. At the second position, the tip of the lever body 60 to which the second rod 62 is connected is farthest from the first virtual center line 01 in the width direction Dw. In addition, at the second position, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 enter the second state. The lever drive unit 7 of the present embodiment has a switch 71, a drive bar 72, and a lock bar 73.

[0046]

The switch 71 is a driving source for operating the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 in the branching device 4. The switch 71 moves the drive bar 72

in the width direction Dw. The switch 71 is disposed on the outer side of the main line guideway 2 on the side opposite to the position where the lever body 60 is disposed. The switch 71 has a hydraulic cylinder, an electromagnetic cylinder, an electric motor, or the like. In the present embodiment, only one switch 71 is disposed in the branching device 4.

[0047]

The drive bar 72 is connected to the lever body 60. The drive bar 72 is moved in the width direction Dw by the switch 71 to rotate the lever body 60. The drive bar 72 of the present embodiment is a rod-shaped member extending in the width direction Dw. The drive bar 72 is disposed in the groove formed below the running surface 11a, similarly to the first rod 61. The drive bar 72 is disposed between the first rod 61 and the second rod 62 in the first direction D1. The tip of the drive bar 72 is rotatably connected to the lever body 60 between a position where the first rod 61 and the lever body 60 are connected and a position where the second rod 62 and the lever body 60 are connected, in the first direction D1. Specifically, the switch 71 moves the tip of the drive bar 72 to a position closest to the switch 71 in the width direction Dw, so that the drive bar 72 rotates the lever body 60 to the first position. Further, the switch 71 moves the tip of the drive bar 72 to a position

farthest from the switch 71 in the width direction Dw, so that the drive bar 72 rotates the lever body 60 to the second position.

[0048]

The lock bar 73 is connected to the lever body 60. The lock bar 73 of the present embodiment is a member that expands and contracts in the width direction Dw. The lock bar 73 is disposed in the groove formed below the running surface 11a, similarly to the first rod 61. The lock bar 73 is disposed between the first rod 61 and the drive bar 72 in the first direction D1. The tip of the lock bar 73 is rotatably connected to the lever body 60 between a position where the first rod 61 and the lever body 60 are connected and a position where the drive bar 72 and the lever body 60 are connected, in the first direction D1. The lock bar 73 is locked so as not to be able to expand or contract based on a signal from the switch 71, in a state where the drive bar 72 rotates the lever body 60 to the first position or the second position. Further, the lock bar 73 is unlocked so as to be able to expand and contract based on a signal from the switch 71, when the drive bar 72 rotates the lever body 60 from the first position or the second position.

[0049]

Here, it is preferable that each member of the movable

device 6 is configured to satisfy the following two equations.

$$X1 = (M1/L1) \times (TS \times R1/RT) \dots \text{(Equation 1)}$$

$$X2 = (M2/L2) \times (TS \times R2/RT) \dots \text{(Equation 2)}$$

[0050]

X1 is a stroke (movement amount) of the tip of the first main line movable guide 41 in the width direction Dw. X1 is determined by the shape of the main line guideway 2 and the turnout switch guideway 3.

X2 is a stroke (movement amount) of the tip of the second main line movable guide 42 in the width direction Dw. X2 is determined by the shape of the main line guideway 2 and the turnout switch guideway 3.

M1 is the length of the first main line movable guide 41 in the first direction D1. M1 is determined by the shape of the main line guideway 2 and the turnout switch guideway 3.

M2 is the length of the second main line movable guide 42 in the first direction D1. M2 is determined by the shape of the main line guideway 2 and the turnout switch guideway 3.

L1 is a length between a base end of the first main line movable guide 41 in the first direction D1 and a position where a force is applied to the first main line movable guide 41. The position where a force is applied to

the first main line movable guide 41 in the present embodiment is a connection position between the first rod 61 and the first main line movable guide 41. L1 is determined in a range where the first main line movable guide 41 does not interfere with the main line running path 21, based on M1 and M2.

L2 is a length between the base end of the second main line movable guide 42 and a position where a force is applied to the second main line movable guide 42 in the first direction D1. The position where a force is applied to the second main line movable guide 42 in the present embodiment is a connection position between the second rod 62 and the second main line movable guide 42. L2 is determined in a range where the second main line movable guide 42 does not interfere with the main line running path 21, based on M1 and M2.

TS is a stroke of the drive bar 72 in the width direction Dw. The TS is determined by the type of the switch 71 used.

R1 is a length between one end of the lever body 60 in the width direction Dw and a connection position between the lever body 60 and the first rod 61.

R2 is a length between one end of the lever body 60 in the width direction Dw and a connection position between the lever body 60 and the second rod 62.

RT is a length between one end of the lever body 60 in the width direction Dw and a connection position between the lever body 60 and the drive bar 72. The RT is determined by the type (output) of the switch 71 to be used.

[0051]

Next, a case where the vehicle 100 runs on the main line guideway 2 in the center guide-type guideway transportation system 1 according to the present embodiment will be described. In the present embodiment, when the vehicle 100 travels from the first main line guideway 2A toward the second main line guideway 2B, the branching device 4 is switched to the first state. Specifically, the switch 71 moves the tip of the drive bar 72 to a position closest to the switch 71 in the width direction Dw. As the drive bar 72 moves, the lever body 60 is parallel to the main line guide 22. As a result, as shown in Figs. 2 and 3, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved by the first rod 61 and the second rod 62 to enter the first state. Thus, the first main line movable guide 41 and the second main line movable guide 42 are moved from the main line retract position to the main line guide position. At the same time, the first turnout switch movable guide 51 and the second turnout switch movable guide

52 are moved from the turnout switch guide position to the turnout switch retract position. Therefore, the main line guide 22 of the first main line guideway 2A and the main line guide 22 of the second main line guideway 2B are connected by the first main line movable guide 41, the main line fixing guide 43, and the second main line movable guide 42. Then, the vehicle 100 that has entered the turnout switch area A from the first main line guideway 2A runs in the turnout switch area A while the guide wheels 103 come into contact with the first main line movable guide 41, the main line fixing guide 43, and the second main line movable guide 42, and is guided to the second main line guideway 2B.

[0052]

Next, a case where the vehicle 100 runs on the turnout switch guideway 3 in the center guide-type guideway transportation system 1 according to the present embodiment will be described. In the present embodiment, when the vehicle 100 travels from the first main line guideway 2A toward the turnout switch guideway 3, the branching device 4 is switched to the second state. Specifically, as shown in Fig. 1, the switch 71 moves the tip of the drive bar 72 to a position farthest from the switch 71 in the width direction Dw. As the drive bar 72 moves, the lever body 60 is inclined such that a tip thereof is separated from the main line guide 22. As a result, as shown in Figs. 4 and

5, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved by the first rod 61 and the second rod 62 to enter the second state. Thus, the first main line movable guide 41 and the second main line movable guide 42 are moved from the main line guide position to the main line retract position. At the same time, the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are moved from the turnout switch retract position to the turnout switch guide position. Thus, the main line guide 22 of the first main line guideway 2A and the turnout switch guide 32 of the turnout switch guideway 3 are connected by the first turnout switch movable guide 51, the turnout switch fixing guide 53, and the second turnout switch movable guide 52. Then, the vehicle 100 that has entered the turnout switch area A from the first main line guideway 2A runs in the turnout switch area A while the guide wheels 103 come into contact with the first turnout switch movable guide 51, the turnout switch fixing guide 53, and the second turnout switch movable guide 52, and is guided to the turnout switch guideway 3.

[0053]

(Action effect)

In the center guide-type guideway transportation

system 1 of the first embodiment, in the turnout switch area A between the main line guideway 2 and the turnout switch guideway 3, a first main line movable guide 41 and a second main line movable guide 42 that guide the vehicle 100 so as to travel on the main line guideway 2 as it is, and a first turnout switch movable guide 51 and a second turnout switch movable guide 52 that guide the vehicle 100 so as to travel on the turnout switch guideway 3. That is, two movable guides are disposed in the turnout switch area A, even in a case where the vehicle 100 is guided to any of the main line guideway 2 and the turnout switch guideway 3. Therefore, compared to a case where only one movable guide is disposed in the same region, as in a case where the first main line movable guide 41 and the second main line movable guide 42 are integrally formed, the lengths of the first main line movable guide 41 and the second main line movable guide 42 and the lengths of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are shortened. Thus, it is possible to reduce the moving range when the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved. Thus, it is possible to reduce the space for installing the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable

guide 51, and the second turnout switch movable guide 52. As a result, the space for the turnout switch area A can be reduced regardless of the shape of the turnout switch area A. Further, since the space for the turnout switch area A is reduced, the width of the entire guideway 10 can be reduced, and the cost when forming the guideway 10 can be reduced. Further, since the width of the guideway 10 is reduced, even when the guideway 10 is formed on an elevated track, it is possible to prevent the elevated track from becoming large.

[0054]

Further, the first main line movable guide 41 and the second main line movable guide 42 are disposed at positions deviated from the running surface 11a of the turnout switch running path 31, when moved to the main line retract position where the vehicle 100 is not guided. Further, the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are disposed at positions deviated from the running surface 11a of the main line running path 21, when moved to the turnout switch retract position where the vehicle 100 is not guided. Therefore, when the movable guide moves to a position where the vehicle 100 is not guided, the movable guide does not overlap with the running surface 11a on which the vehicle 100 runs. Therefore, even when the guide is disposed so as to protrude on the running

surface 11a, the branching device 4 can be disposed without hindering the traveling of the vehicle 100.

[0055]

Further, in a state where the first main line movable guide 41 and the second main line movable guide 42 are positioned at the main line guide positions, the main line fixing guide 43 that comes into contact with at least one of the first main line movable guide 41 or the second main line movable guide 42 (in the present embodiment, the second main line movable guide 42) is fixed to the main line running path 21 between the first main line movable guide 41 and the second main line movable guide 42. Therefore, when the vehicle 100 passes toward the second main line guideway 2B, not only the second main line movable guide 42 but also the main line fixing guide 43 can receive the load generated when the guide wheels 103 come into contact with the second main line movable guide 42. Thus, it is possible to reduce a large load from being applied to the second main line movable guide 42. Therefore, the rigidity and the strength required for the vehicle 100 to pass toward the second main line guideway 2B can be easily secured as the guide 12 of the turnout switch area A.

[0056]

Similarly, in a state where the first turnout switch movable guide 51 and the second turnout switch movable guide

52 are positioned at the turnout switch guide positions, the turnout switch fixing guide 53 that comes into contact with at least one of the first turnout switch movable guide 51 or the second turnout switch movable guide 52 (in the present embodiment, the second turnout switch movable guide 52) is fixed to the turnout switch running path 31 between the first turnout switch movable guide 51 and the second turnout switch movable guide 52. Therefore, when the vehicle 100 passes toward the turnout switch guideway 3, not only the second turnout switch movable guide 52 but also the turnout switch fixing guide 53 can receive the load generated when the guide wheels 103 come into contact with the second turnout switch movable guide 52. Thus, it is possible to reduce a large load from being applied to the second turnout switch movable guide 52. In particular, when the vehicle 100 runs while turning so as to change the running direction of the vehicle 100 from the main line guideway 2 as in the turnout switch guideway 3, a centrifugal force is generated and a load the guide 12 receives from the guide wheels 103 is very large. However, since the turnout switch fixing guide 53 can support the second turnout switch movable guide 52 from the width direction D_w , the rigidity and the strength required for the vehicle 100 to pass toward the turnout switch guideway 3 can be easily secured as the guide 12 for the turnout

switch area A.

[0057]

The lever body 60 can be temporarily fixed at the first position or the second position by the lock bar 73 of the movable device 6. Since the position of the lever body 60 is temporarily fixed, in the branching device 4, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be held in the first state or the second state. That is, the lock bar 73 allows the positions of the first main line movable guide 41 and the second main line movable guide 42 to be fixed at the main line guide position or the main line retract position, and the positions of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 to be fixed at the turnout switch retract position or the turnout switch guide position. Further, since the movable device 6 is provided with a lock structure, it is not necessary to provide the lock structure in the guide itself disposed on the running path 11 like the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52. Thus, the structure of the branching device 4 can be simplified, as compared with a case where each of the first main line movable guide

41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 is provided with a lock structure. Therefore, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0058]

In addition, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are simultaneously moved by the movable device 6. Therefore, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 move in conjunction with each other. That is, the time lag at the time of switching is reduced, and the guideway 10 on which the vehicle 100 travels can be stably switched between the main line guideway 2 and the turnout switch guideway 3.

[0059]

Further, the lever body 60 is moved to the first position and the second position by the lever drive unit 7, the first main line movable guide 41 and the first turnout switch movable guide 51 are rotated by the first rod 61, and the second main line movable guide 42 and the second turnout switch movable guide 52 are rotated by the second rod 62. Thus, the first main line movable guide 41, the

second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved in conjunction with the movement of the lever body 60. That is, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved in conjunction with each other only by rotating the lever body 60. With such a simple structure, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved. With a simple structure, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0060]

In the present embodiment, compared to a case where the movable guide is one long rail-shaped member, it is possible to reduce the moving range when the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved. As a result, a stroke for moving the drive bar 72 in order to rotate the lever body 60 between the first position and the second position is also reduced. Further, for this reason, the driving force required for the switch 71 that drives the

drive bar 72 can be reduced. Thus, it is possible to use the switch 71 having a proven track record as used in railways and the like in the related art. Therefore, the reliability of the branching device 4 can be improved and the cost can be reduced. Further, in the branching device 4 of the present embodiment, only one switch 71 is disposed as a driving source. Therefore, when the branching device 4 is controlled, only one switch 71 may be controlled. Therefore, reliability when controlling the branching device 4 can be improved.

[0061]

<Second Embodiment>

Next, a second embodiment of the center guide-type guideway transportation system 1 according to the present disclosure will be described. In the center guide-type guideway transportation system 1 described below, the same reference numerals are given to the configurations common to the configurations of the first embodiment in the drawings, and the description thereof will be omitted.

[0062]

(Configuration of Movable Device)

As shown in Fig. 6, in the center guide-type guideway transportation system 1 of the second embodiment, the structure of the movable device is different from the movable device of the first embodiment. Similarly to the

movable device 6 of the first embodiment, the movable device 6A of the second embodiment, as the first state, simultaneously moves the first main line movable guide 41 and the second main line movable guide 42 from the main line retract position to the main line guide position, and simultaneously moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch guide position to the turnout switch retract position. Further, a movable device 6A of the second embodiment, as the second state, simultaneously moves the first main line movable guide 41 and the second main line movable guide 42 from the main line guide position to the main line retract position, and simultaneously moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch retract position to the turnout switch guide position. The movable device 6A of the second embodiment includes a slide portion 60A, a first rod 61A, a second rod 62A, and a slide drive unit 7A.

[0063]

The slide portion 60A simultaneously moves the first rod 61A and the second rod 62A by moving in a direction intersecting the first direction D1 with respect to the main line guideway 2. The slide portion 60A of the present embodiment moves in the width direction Dw with respect to

the main line guideway 2. The slide portion 60A has a slide body 601 and a pair of slide receiving portions 602.

[0064]

The slide body 601 is a rod-shaped member that extends straight in the first direction D1. The slide body 601 of the present embodiment extends parallel to the main line guide 22 on the outside of the main line guideway 2 opposite to the position where the turnout switch guideway 3 extends. The slide body 601 are disposed such that both ends are movable on the slide receiving portions 602.

[0065]

The slide receiving portion 602 is a rail-shaped member that extends straight in the width direction Dw with respect to the main line guideway 2. A pair of slide receiving portions 602 are disposed apart from each other in the first direction D1. The slide body 601 is movable in parallel on the pair of slide receiving portions 602 so as to be orthogonal to the first direction D1.

[0066]

The first rod 61A connects the first main line movable guide 41 and the first turnout switch movable guide 51 to the slide portion 60A. One end portion of the first rod 61A is rotatably connected to the slide body 601 at a position close to the slide receiving portion 602 on one side in the first direction D1. The first rod 61A of the

second embodiment has the same structure as the first rod 61 of the first embodiment except that it is connected to the slide body 601. The first rod 61A moves the other end portion of the first main line movable guide 41 and the other end portion of the first turnout switch movable guide 51 so as to follow the movement of the slide portion 60A. Thus, as the slide body 601 moves in parallel in the width direction Dw, the first rod 61A simultaneously rotates the first main line movable guide 41 and the first turnout switch movable guide 51.

[0067]

The second rod 62A connects the second main line movable guide 42 and the second turnout switch movable guide 52 to the slide portion 60A. One end portion of the second rod 62A is rotatably connected to the slide body 601 at a position close to the slide receiving portion 602 on one side disposed on a side opposite to the position where the first rod 61 is connected, in the first direction D1. The second rod 62A of the second embodiment has the same structure as the second rod 62 of the first embodiment except that it is connected to the slide body 601. The second rod 62A moves the other end portion of the second main line movable guide 42 and the other end portion of the second turnout switch movable guide 52 so as to follow the movement of the slide portion 60A. Thus, the second rod

62A simultaneously rotates the second main line movable guide 42 and the second turnout switch movable guide 52 as the slide body 601 moves in parallel in the width direction Dw.

[0068]

The slide drive unit 7A moves the slide portion 60A in a direction intersecting the first direction D1. The slide drive unit 7A of the present embodiment moves the slide body 601 in parallel between the first position and the second position deviated from the first position. At the first position, the slide body 601 is located closest to the main line guide 22 in the width direction Dw. In addition, at the first position, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 enter the first state. At the second position, the slide body 601 is at the farthest position with respect to the main line guide 22 in the width direction Dw. In addition, at the second position, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 enter the second state. The slide drive unit 7A of the present embodiment includes a switch 71, a drive bar 72A, and a lock bar 73A.

[0069]

The tips of the drive bar 72A and the lock bar 73A are connected to the slide body 601. The drive bar 72A and the lock bar 73A are connected to the slide body 601 between a position where the first rod 61A is connected and a position where the second rod 62A is connected, in the first direction D1. Further, the drive bar 72A and the lock bar 73A have the same structure as the drive bar 72 and the lock bar 73 of the first embodiment except for being connected to the slide body 601. The switch 71 has the same structure as that of the first embodiment.

[0070]

Here, it is preferable that each member of the movable device 6A of the second embodiment is configured to satisfy the following two equations.

$$X1 = (M1/L1) \times TS \dots \text{(Equation 3)}$$

$$X2 = (M2/L2) \times TS \dots \text{(Equation 4)}$$

[0071]

Next, in the second embodiment, when the vehicle 100 travels from the first main line guideway 2A toward the second main line guideway 2B, the branching device 4 is switched to the first state. Specifically, the switch 71 moves the tip of the drive bar 72A to a position closest to the switch 71 in the width direction Dw. As the drive bar 72A moves, the slide body 601 is moved to the position closest to the main line guide 22. As a result, the first

main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved by the first rod 61A and the second rod 62A to enter the first state. Thus, the first main line movable guide 41 and the second main line movable guide 42 are moved from the main line retract position to the main line guide position. At the same time, the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are moved from the turnout switch guide position to the turnout switch retract position.

[0072]

Further, when the vehicle 100 travels from the first main line guideway 2A toward the turnout switch guideway 3, the branching device 4 is switched to the second state. Specifically, the switch 71 moves the tip of the drive bar 72A to a position farthest from the switch 71 in the width direction Dw. As the drive bar 72A moves, the slide body 601 is moved to a position farthest from the main line guide 22. As a result, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved by the first rod 61A and the second rod 62A to enter the second state. Thus, the first main line movable guide 41 and the second main line movable guide 42

are moved from the main line guide position to the main line retract position. At the same time, the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are moved from the turnout switch retract position to the turnout switch guide position.

[0073]

(Action effect)

In the center guide-type guideway transportation system 1 of the second embodiment, the slide body 601 is moved to the first position and the second position by the slide drive unit 7A, the first main line movable guide 41 and the first turnout switch movable guide 51 are rotated by the first rod 61A, and the second main line movable guide 42 and the second turnout switch movable guide 52 are rotated by the second rod 62A. Thus, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved in conjunction with the movement of the slide body 601. That is, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved in conjunction with each other only by moving the slide body 601 in parallel. With such a simple structure, the first main line movable guide 41, the second main line

movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved. With a simple structure, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0074]

<Third Embodiment>

Next, a third embodiment of the center guide-type guideway transportation system 1 according to the present disclosure will be described. In the center guide-type guideway transportation system 1 described below, the same reference numerals are given to the configurations common to the configurations of the first embodiment and the second embodiment in the drawings, and the description thereof will be omitted.

[0075]

(Configuration of Movable Device)

As shown in Fig. 7, in the center guide-type guideway transportation system 1 of the third embodiment, the structure of the movable device is different from the movable devices of the first embodiment and the second embodiment. As the first state, the movable device 6B according to the third embodiment separately moves the first main line movable guide 41 and the second main line movable guide 42 from the main line retract position to the main

line guide position, and separately moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch guide position to the turnout switch retract position. Further, as the second state, the movable device 6B according to the third embodiment separately moves the first main line movable guide 41 and the second main line movable guide 42 from the main line guide position to the main line retract position, and separately moves the first turnout switch movable guide 51 and the second turnout switch movable guide 52 from the turnout switch retract position to the turnout switch guide position. The movable device 6B according to the third embodiment includes a first movable device 81 and a second movable device 82.

[0076]

The first movable device 81 simultaneously moves the first main line movable guide 41 and the first turnout switch movable guide 51. Specifically, as the first state, the first movable device 81 moves the first main line movable guide 41 from the main line retract position to the main line guide position, and moves the first turnout switch movable guide 51 from the turnout switch guide position to the turnout switch retract position, simultaneously. Further, as the second state, the first movable device 81 moves the first main line movable guide 41 from the main

line guide position to the main line retract position, and moves the first turnout switch movable guide 51 from the turnout switch retract position to the turnout switch guide position, simultaneously. The first movable device 81 of the present embodiment includes a switch 71, a drive bar 72B, and a lock bar 73B.

[0077]

The second movable device 82 can be driven independently of the first movable device 81. The second movable device 82 simultaneously moves the second main line movable guide 42 and the second turnout switch movable guide 52. As the first state, the second movable device 82 moves the second main line movable guide 42 from the main line retract position to the main line guide position, and moves the second turnout switch movable guide 52 from the turnout switch guide position to the turnout switch retract position, simultaneously.. Further, as the second state, the second movable device 82 moves the second main line movable guide 42 from the main line guide position to the main line retract position, and moves the second turnout switch movable guide 52 from the turnout switch retract position to the turnout switch guide position, simultaneously. The second movable device 82 of the present embodiment has a switch 71 with the same configuration as the first movable device 81, a drive bar 72B, and a lock bar 73B.

[0078]

The switch 71 has the same structure as the switch 71 of the first embodiment. The switch 71 of the first movable device 81 corresponds to the first main line movable guide 41 and the first turnout switch movable guide 51. The switch 71 of the first movable device 81 is disposed on the outer side of the main line guideway 2 so as to be closer to the first turnout switch movable guide 51 than the first main line movable guide 41 in the width direction Dw.

[0079]

The switch 71 of the second movable device 82 corresponds to the second main line movable guide 42 and the second turnout switch movable guide 52. The switch 71 of the second movable device 82 is disposed away from the switch 71 of the first movable device 81 in the first direction D1. The switch 71 of the second movable device 82 is disposed on the outer side of the main line guideway 2 so as to be on the same side as the switch 71 of the first movable device 81 in the width direction Dw.

[0080]

The drive bar 72B and the lock bar 73B have the same structure as the drive bar 72 and the lock bar 73 of the first embodiment except that the connection destinations are different. The drive bar 72B and the lock bar 73B of the first movable device 81 are connected to the first main

line movable guide 41 and the first turnout switch movable guide 51. The tips of the drive bar 72B and the lock bar 73B of the first movable device 81 are rotatably connected to the other end portion of the first main line movable guide 41. The tips of the drive bar 72B and the lock bar 73B of the first movable device 81 are rotatably connected to the other end portion of the first turnout switch movable guide 51 at a position close to the switch 71.

[0081]

The drive bar 72B and the lock bar 73B of the second movable device 82 are connected to the second main line movable guide 42 and the second turnout switch movable guide 52. The tips of the drive bar 72B and the lock bar 73B of the second movable device 82 are rotatably connected to the other end portion of the second main line movable guide 42. The tips of the drive bar 72B and the lock bar 73B of the second movable device 82 are rotatably connected to the other end portion of the second turnout switch movable guide 52 at a position close to the switch 71.

[0082]

Here, it is preferable that each member of the movable device 6B of the third embodiment is configured to satisfy the following two equations, as in the second embodiment.

$$X1 = (M1/L1) \times TS \dots \text{(Equation 5)}$$

$$X2 = (M2/L2) \times TS \dots \text{(Equation 6)}$$

L1 is a length between a base end of the first main line movable guide 41 in the first direction D1 and a position where a force is applied to the first main line movable guide 41. The position where a force is applied to the first main line movable guide 41 in the third embodiment is a connection position between the lock bar 73B and the first main line movable guide 41.

L2 is a length between the base end of the second main line movable guide 42 and a position where a force is applied to the second main line movable guide 42 in the first direction D1. The position where a force is applied to the second main line movable guide 42 in the third embodiment is a connection position between the lock bar 73B and the second main line movable guide 42. L2 is determined in a range where the second main line movable guide 42 does not interfere with the main line running path 21, based on M1 and M2.

[0083]

Next, in the third embodiment, when the vehicle 100 travels from the first main line guideway 2A toward the second main line guideway 2B, the branching device 4 is switched to the first state. Specifically, the switch 71 of the first movable device 81 moves the tip of the drive bar 72B of the first movable device 81 to a position closest to the switch 71 in the width direction Dw. As the drive

bar 72B moves, the first main line movable guide 41 and the first turnout switch movable guide 51 are moved to enter the first state. Thus, the first main line movable guide 41 is moved from the main line retract position to the main line guide position, and the first turnout switch movable guide 51 is moved from the turnout switch guide position to the turnout switch retract position, simultaneously. Further, the switch 71 of the second movable device 82 moves the tip of the drive bar 72B of the second movable device 82 to a position closest to the switch 71 in the width direction Dw. As the drive bar 72B moves, the second main line movable guide 42 and the second turnout switch movable guide 52 are moved to enter the first state. Thus, the second main line movable guide 42 is moved from the main line retract position to the main line guide position, and the second turnout switch movable guide 52 is moved from the turnout switch guide position to the turnout switch retract position, simultaneously.

[0084]

Further, when the vehicle 100 travels from the first main line guideway 2A toward the turnout switch guideway 3, the branching device 4 is switched to the second state. Specifically, the switch 71 of the first movable device 81 moves the tip of the drive bar 72B of the first movable device 81 to a position farthest from the switch 71 in the

width direction Dw. As the drive bar 72B moves, the first main line movable guide 41 and the first turnout switch movable guide 51 are moved to enter the second state. Thus, the first main line movable guide 41 is moved from the main line guide position to the main line retract position, and the first turnout switch movable guide 51 is moved from the turnout switch retract position to the turnout switch guide position, simultaneously. Further, the switch 71 of the second movable device 82 moves the tip of the drive bar 72B of the second movable device 82 to a position farthest from the switch 71 in the width direction Dw. As the drive bar 72B moves, the second main line movable guide 42 and the second turnout switch movable guide 52 are moved to enter the second state. Thus, the second main line movable guide 42 is moved from the main line guide position to the main line retract position, and the second turnout switch movable guide 52 is moved from the turnout switch retract position to the turnout switch guide position, simultaneously.

[0085]

(Action effect)

In the center guide-type guideway transportation system 1 of the third embodiment, the first main line movable guide 41 and the first turnout switch movable guide 51, and the second main line movable guide 42 and the second turnout switch movable guide 52 are moved independently of

each other by the first movable device 81 and the second movable device 82 having the switch 71. By not having a structure in which the four movable guides of the first main line movable guide 41, the first turnout switch movable guide 51, the second main line movable guide 42, and the second turnout switch movable guide 52 are simultaneously moved, with a simple structure with a small number of parts, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved. With a simple structure with a small number of parts, maintainability can be improved and maintenance costs can be reduced.

[0086]

(Other embodiments)

Although the embodiment of the present disclosure has been described in detail with reference to the drawings, the specific configuration is not limited to this embodiment, and includes design changes and the like within a range not deviating from the gist of the present disclosure.

[0087]

In the above embodiment, the branching device 4 has the main line fixing guide 43 and the turnout switch fixing guide 53, but the structure is not limited to this. Depending on the shape of the turnout switch area A, the

branching device 4 may not include the main line fixing guide 43 and the turnout switch fixing guide 53. Further, the branching device 4 may have only one of the main line fixing guide 43 and the turnout switch fixing guide 53.

[0088]

Further, the main line fixing guide 43 is not limited to a structure that comes into contact with only the second main line movable guide 42 disposed at the main line guide position as in the present embodiment. The main line fixing guide 43 may have a structure that comes into contact with only the first main line movable guide 41 disposed at the main line guide position, and a structure that comes into contact with both the first main line movable guide 41 and the second main line movable guide 42 disposed at the main line guide position.

[0089]

Similarly, the turnout switch fixing guide 53 is not limited to a structure that comes into contact with only the second turnout switch movable guide 52 disposed at the turnout switch guide position as in the present embodiment. The turnout switch fixing guide 53 may have a structure that comes into contact with only the first turnout switch movable guide 51 disposed at the turnout switch guide position, and a structure that comes into contact with both the first turnout switch movable guide 51 and the second

turnout switch movable guide 52 disposed at the turnout switch guide position.

[0090]

Further, the movable devices 6, 6A, and 6B are not limited to the structure as in the present embodiment. The movable device 6 may have any structure as long as the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved.

[0091]

<Additional Notes>

The center guide-type guideway transportation system 1 described in the embodiment is understood as follows, for example.

[0092]

(1) A branching device 4 according to a first aspect is a branching device 4 disposed in a turnout switch area A between a main line guideway 2 and a turnout switch guideway 3, the branching device including: a first main line movable guide 41 and a second main line movable guide 42 that are movable between a main line guide position where a vehicle 100 is able to be guided from a first main line guideway 2A to a second main line guideway 2B, and a main line retract position where the vehicle 100 is not able to be guided from the first main line guideway 2A to the second main line

guideway 2B; a first turnout switch movable guide 51 and a second turnout switch movable guide 52 that are movable between a turnout switch guide position where the vehicle 100 is able to be guided from the first main line guideway 2A to the turnout switch guideway 3, and a turnout switch retract position where the vehicle 100 is not able to be guided from the first main line guideway 2A to the turnout switch guideway 3; and a movable device 6 that moves the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52.

[0093]

(2) The branching device 4 according to a second aspect is the branching device 4 according to (1), in which the first main line movable guide 41 and the second main line movable guide 42 are formed to extend on a first virtual center line 01 at the main line guide position, and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are formed to extend on a second virtual center line 02 at the turnout switch guide position.

[0094]

(3) The branching device 4 according to a third aspect is the branching device 4 of (2), in which the first main line movable guide 41 and the second main line movable guide 42 are rotatable with one end portion disposed on the first

virtual center line 01 as a rotation center, the other end portion is disposed on the first virtual center line 01, at the main line guide position, and the other end portion is disposed at a position deviated from the first virtual center line 01, at the main line retract position, and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are rotatable with one end portion disposed on the second virtual center line 02 as a rotation center, the other end portion is disposed on the second virtual center line 02, at the turnout switch guide position, and the other end portion is disposed at a position deviated from the second virtual center line 02, at the turnout switch retract position.

[0095]

In the branching device 4, two movable guides are disposed in the turnout switch area A, even in a case where the vehicle 100 is guided to any of the main line guideway 2 and the turnout switch guideway 3. Therefore, compared to a case where only one movable guide is disposed in the same region, as in a case where the first main line movable guide 41 and the second main line movable guide 42 are integrally formed, the lengths of the first main line movable guide 41 and the second main line movable guide 42 and the lengths of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are

shortened. Thus, it is possible to reduce the moving range when the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 are moved. Thus, it is possible to reduce the space for installing the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52. As a result, the space for the turnout switch area A can be reduced regardless of the shape of the turnout switch area A.

[0096]

(4) The branching device 4 according to a fourth aspect is the branching device 4 according to any one of (1) to (3), further including: a main line fixing guide 43 disposed between the first main line movable guide 41 and the second main line movable guide 42 to guide the vehicle 100, and a turnout switch fixing guide 53 disposed between the first turnout switch movable guide 51 and the second turnout switch movable guide 52 to guide the vehicle 100.

[0097]

(5) The branching device 4 according to a fifth aspect is the branching device 4 according to (2) or (3), further including: a main line fixing guide 43 that is disposed between the first main line movable guide 41 and the second

main line movable guide 42 and guides the vehicle 100; and a turnout switch fixing guide 53 that is disposed between the first turnout switch movable guide 51 and the second turnout switch movable guide 52 and guides the vehicle 100, in which the main line fixing guide 43 is formed to extend on the first virtual center line 01, and comes into contact with at least one of the first main line movable guide 41 or the second main line movable guide 42, in a state where the first main line movable guide 41 and the second main line movable guide 42 are positioned at the main line guide position, and the turnout switch fixing guide 53 is formed to extend on the second virtual center line 02, and comes into contact with at least one of the first turnout switch movable guide 51 or the second turnout switch movable guide 52, in a state where the first turnout switch movable guide 51 and the second turnout switch movable guide 52 are positioned at the turnout switch guide position.

[0098]

Thus, when the vehicle 100 passes toward the second main line guideway 2B, not only the first main line movable guide 41 and the second main line movable guide 42, but also the main line fixing guide 43 can receive the load generated when the guide wheels 103 come into contact with the first main line movable guide 41 or the second main line movable guide 42. Thus, it is possible to reduce a large load from

being applied to the first main line movable guide 41 and the second main line movable guide 42. Similarly, when the vehicle 100 passes toward the turnout switch guideway 3, not only the first turnout switch movable guide 51 or the second turnout switch movable guide 52 but also the turnout switch fixing guide 53 can receive the load generated when the guide wheels 103 come into contact with the first turnout switch movable guide 51 or the second turnout switch movable guide 52. Thus, it is possible to reduce a large load from being applied to the first turnout switch movable guide 51 and the second turnout switch movable guide 52. Therefore, the rigidity and the strength required for the vehicle 100 to pass toward the second main line guideway 2B and the turnout switch guideway 3 can be easily secured as the guide for the turnout switch area A.

[0099]

(6) The branching device 4 according to a sixth aspect is the branching device 4 according to any one of (1) to (5), in which the movable device 6 moves the first main line movable guide 41 and the second main line movable guide 42 between the main line guide position and the main line retract position and is able to fix positions of the first main line movable guide 41 and the second main line movable guide 42 at the main line guide position and the main line retract position, respectively, and moves the first turnout

switch movable guide 51 and the second turnout switch movable guide 52 between the turnout switch guide position and the turnout switch retract position and is able to fix positions of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 at the turnout switch guide position and the turnout switch retract position, respectively.

[0100]

Thus, the positions of the first main line movable guide 41 and the second main line movable guide 42 can be fixed at the main line guide position or the main line retract position, and the positions of the first turnout switch movable guide 51 and the second turnout switch movable guide 52 can be fixed at the turnout switch retract position or the turnout switch guide position. Further, since the movable device 6 is provided with a lock structure, it is not necessary to provide the lock structure in the guide itself disposed on the running path 11 like the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52. Thus, the structure of the branching device 4 can be simplified, as compared with a case where each of the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second

turnout switch movable guide 52 is provided with a lock structure. Therefore, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0101]

(7) The branching device 4 according to a seventh aspect is the branching device 4 according to any one of (1) to (6), in which the movable device 6 may simultaneously move the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52.

[0102]

Thus, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 move in conjunction with each other. That is, the time lag at the time of switching is reduced, and the guideway 10 on which the vehicle 100 travels can be stably switched between the main line guideway 2 and the turnout switch guideway 3.

[0103]

(8) The branching device 4 according to an eighth aspect is the branching device 4 according to (7), in which the movable device 6 may include a lever body 60 whose one end is rotatably supported with respect to the main line guideway 2, a first rod 61 that connects the first main line movable guide 41 and the first turnout switch movable guide

51 to the lever body 60, and rotates the first main line movable guide 41 and the first turnout switch movable guide 51, as the lever body 60 rotates, a second rod 62 that connects the second main line movable guide 42 and the second turnout switch movable guide 52 to the lever body 60, and rotates the second main line movable guide 42 and the second turnout switch movable guide 52, as the lever body 60 rotates, and a lever drive unit 7 that presses the lever body 60 and rotates the lever body 60, the lever drive unit 7 may rotate the lever body 60 between a first position and a second position deviated from the first position, at the first position, the first main line movable guide 41 and the second main line movable guide 42 may be disposed at the main line guide position and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 may be disposed at the turnout switch retract position, and at the second position, the first main line movable guide 41 and the second main line movable guide 42 may be disposed at the main line retract position and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 may be disposed at the turnout switch guide position.

[0104]

Thus, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable

guide 51, and the second turnout switch movable guide 52 can be simultaneously moved in conjunction with the movement of the lever body 60. That is, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved in conjunction with each other only by moving the lever body 60. With such a simple structure, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved. With a simple structure, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0105]

(9) The branching device 4 according to a ninth aspect is the branching device 4 according to (7), in which the movable device 6A may include a slide body 601 that is movable in parallel to the main line guideway 2, a first rod 61A that connects the first main line movable guide 41 and the first turnout switch movable guide 51 to the slide body 601, and rotates the first main line movable guide 41 and the first turnout switch movable guide 51, as the slide body 601 moves, a second rod 62A that connects the second main line movable guide 42 and the second turnout switch movable guide 52 to the slide body 601, and rotates the

second main line movable guide 42 and the second turnout switch movable guide 52, as the slide body 601 moves, and a slide drive unit 7A that moves the slide body 601, the slide drive unit 7A may move the slide body 601 in parallel between a first position and a second position deviated from the first position, at the first position, the first main line movable guide 41 and the second main line movable guide 42 may be disposed at the main line guide position and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 may be disposed at the turnout switch retract position, and at the second position, the first main line movable guide 41 and the second main line movable guide 42 may be disposed at the main line retract position and the first turnout switch movable guide 51 and the second turnout switch movable guide 52 may be disposed at the turnout switch guide position.

[0106]

Thus, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved in conjunction with the movement of the slide body 601. That is, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved in conjunction with

each other only by moving the slide body 601 in parallel. With such a simple structure, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be simultaneously moved. With a simple structure, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0107]

(10) The branching device 4 according to a tenth aspect is the branching device 4 according to any one of (1) to (6), in which the movable device 6B may include a first movable device 81 that simultaneously moves the first main line movable guide 41 and the first turnout switch movable guide 51, and a second movable device 82 that is drivable independently of the first movable device 81 and simultaneously moves the second main line movable guide 42 and the second turnout switch movable guide 52.

[0108]

Thus, the first main line movable guide 41 and the first turnout switch movable guide 51, and the second main line movable guide 42 and the second turnout switch movable guide 52 are moved independently of each other by the first movable device 81 and the second movable device 82. By not having a structure in which the four movable guides of the first main line movable guide 41, the first turnout switch

movable guide 51, the second main line movable guide 42, and the second turnout switch movable guide 52 are simultaneously moved, with a simple structure with a small number of parts, the first main line movable guide 41, the second main line movable guide 42, the first turnout switch movable guide 51, and the second turnout switch movable guide 52 can be moved. With a simple structure with a small number of parts, maintainability can be improved and maintenance costs can be reduced.

[0109]

(11) The branching device 4 according to an eleventh aspect is the branching device 4 according to any one of (1) to (10), in which the movable device 6 may include a switch 71.

[0110]

Thus, since the switch 71 can be used, the reliability of the branching device 4 can be improved and the cost can be reduced.

[0111]

(12) The center guide-type guideway transportation system 1 according to a twelfth aspect includes: the branching device 4 according to any one of (1) to (11); the main line guideway 2 that has a main line running path 21 having a running surface 11a contactable with the running wheels 102 of the vehicle 100 and extending in a first

direction D1, and a main line guide 22 disposed on a first virtual center line 01 positioned at a center of the main line running path 21 in a width direction Dw to guide the vehicle 100; and the turnout switch guideway 3 that has a turnout switch running path 31 extending in a second direction D2 different from the first direction D1 and having the running surface 11a so as to turnout off from the main line running path 21, and a turnout switch guide 32 disposed on a second virtual center line 02 positioned at a center of the turnout switch running path 31 in the width direction Dw to guide the vehicle 100.

Industrial Applicability

[0112]

According to the branching device and the center guide-type guideway transportation system of the present disclosure, a space for a turnout switch area can be reduced regardless of the shape of the turnout switch area.

Reference Signs List

[0113]

1 Guideway transportation system

100 Vehicle

101 Car body

102 Running wheel

103 Guide wheel

104 Power collector

- 10 Guideway
 - 11 Running path
 - 11a Running surface
 - 12 Guide
 - 13 Power rail
- 2 Main line guideway
 - 21 Main line running path
 - 22 Main line guide
 - 01 First virtual center line
 - 23 Main line power rail
 - 2A First main line guideway
 - 2B Second main line guideway
- 3 Turnout switch guideway
 - 31 Turnout switch running path
 - 32 Turnout switch guide
 - 02 Second virtual center line
 - 33 Turnout switch power rail
- A Turnout switch area
 - De Extending direction
 - D1 First direction
 - D2 Second direction
 - Dw Width direction
 - Dv Vertical direction
- 4 Branching device
 - 41 First main line movable guide

42 Second main line movable guide
43 Main line fixing guide
51 First turnout switch movable guide
52 Second turnout switch movable guide
53 Turnout switch fixing guide
6, 6A, 6B Movable device
60 Lever body
61, 61A First rod
62, 62A Second rod
7 Lever drive unit
71 Switch
72, 72A, 72B Drive bar
73, 73A, 73B Lock bar
60A Slide portion
601 Slide body
602 Slide receiving portion
7A Slide drive unit
71 Switch
81 First movable device
82 Second movable device
71 Switch

Claims

[Claim 1]

A branching device disposed in a turnout switch area between a main line guideway and a turnout switch guideway, the branching device comprising:

a first main line movable guide and a second main line movable guide that are movable between a main line guide position where a vehicle is able to be guided from a first main line guideway to a second main line guideway, and a main line retract position where the vehicle is not able to be guided from the first main line guideway to the second main line guideway;

a first turnout switch movable guide and a second turnout switch movable guide that are movable between a turnout switch guide position where the vehicle is able to be guided from the first main line guideway to the turnout switch guideway, and a turnout switch retract position where the vehicle is not able to be guided from the first main line guideway to the turnout switch guideway; and

a movable device that moves the first main line movable guide, the second main line movable guide, the first turnout switch movable guide, and the second turnout switch movable guide.

[Claim 2]

The branching device according to Claim 1, wherein
the first main line movable guide and the second main line movable guide are formed to extend on a first virtual center line at the main line guide position, and

the first turnout switch movable guide and the second turnout switch movable guide are formed to extend on a second virtual center line at the turnout switch guide position.

[Claim 3]

The branching device according to Claim 2, wherein
the first main line movable guide and the second main line movable guide are rotatable with one end portion disposed on the first virtual center line as a rotation center, the other end portion is disposed on the first virtual center line, at the main line guide position, and the other end portion is disposed at a position deviated from the first virtual center line, at the main line retract position, and

the first turnout switch movable guide and the second turnout switch movable guide are rotatable with one end portion disposed on the second virtual center line as a rotation center, the other end portion is disposed on the second virtual center line, at the turnout switch guide

position, and the other end portion is disposed at a position deviated from the second virtual center line, at the turnout switch retract position.

[Claim 4]

The branching device according to any one of Claims 1 to 3, further comprising:

a main line fixing guide disposed between the first main line movable guide and the second main line movable guide to guide the vehicle, and

a turnout switch fixing guide disposed between the first turnout switch movable guide and the second turnout switch movable guide to guide the vehicle.

[Claim 5]

The branching device according to Claim 2 or 3, further comprising:

a main line fixing guide that is disposed between the first main line movable guide and the second main line movable guide and guides the vehicle; and

a turnout switch fixing guide that is disposed between the first turnout switch movable guide and the second turnout switch movable guide and guides the vehicle, wherein

the main line fixing guide is formed to extend on the first virtual center line, and comes into contact with at

least one of the first main line movable guide or the second main line movable guide, in a state where the first main line movable guide and the second main line movable guide are positioned at the main line guide position, and

the turnout switch fixing guide is formed to extend on the second virtual center line, and comes into contact with at least one of the first turnout switch movable guide or the second turnout switch movable guide, in a state where the first turnout switch movable guide and the second turnout switch movable guide are positioned at the turnout switch guide position.

[Claim 6]

The branching device according to any one of Claims 1 to 5, wherein

the movable device moves the first main line movable guide and the second main line movable guide between the main line guide position and the main line retract position and is able to fix positions of the first main line movable guide and the second main line movable guide at the main line guide position and the main line retract position, respectively, and moves the first turnout switch movable guide and the second turnout switch movable guide between the turnout switch guide position and the turnout switch retract position and is able to fix positions of the first

turnout switch movable guide and the second turnout switch movable guide at the turnout switch guide position and the turnout switch retract position, respectively.

[Claim 7]

The branching device according to any one of Claims 1 to 6, wherein

the movable device simultaneously moves the first main line movable guide, the second main line movable guide, the first turnout switch movable guide, and the second turnout switch movable guide.

[Claim 8]

The branching device according to Claim 7, wherein the movable device includes

a lever body whose one end is rotatably supported with respect to the main line guideway

a first rod that connects the first main line movable guide and the first turnout switch movable guide to the lever body, and rotates the first main line movable guide and the first turnout switch movable guide, as the lever body rotates,

a second rod that connects the second main line movable guide and the second turnout switch movable guide to the lever body, and rotates the second main line movable guide and the second turnout switch movable guide, as the

lever body rotates, and

a lever drive unit that presses the lever body and rotates the lever body,

the lever drive unit rotates the lever body between a first position and a second position deviated from the first position,

at the first position, the first main line movable guide and the second main line movable guide are disposed at the main line guide position and the first turnout switch movable guide and the second turnout switch movable guide are disposed at the turnout switch retract position, and

at the second position, the first main line movable guide and the second main line movable guide are disposed at the main line retract position and the first turnout switch movable guide and the second turnout switch movable guide are disposed at the turnout switch guide position.

[Claim 9]

The branching device according to Claim 7, wherein

the movable device includes a slide body that is movable in parallel to the main line guideway a first rod that connects the first main line movable guide and the first turnout switch movable guide to the slide body, and rotates the first main line movable guide and the first turnout switch movable guide, as the slide body moves, a

second rod that connects the second main line movable guide and the second turnout switch movable guide to the slide body, and rotates the second main line movable guide and the second turnout switch movable guide, as the slide body moves, and a slide drive unit that moves the slide body, the slide drive unit moves the slide body in parallel between a first position and a second position deviated from the first position, at the first position, the first main line movable guide and the second main line movable guide are disposed at the main line guide position, and the first turnout switch movable guide and the second turnout switch movable guide are disposed at the turnout switch retract position, and at the second position, the first main line movable guide and the second main line movable guide are disposed at the main line retract position, and the first turnout switch movable guide and the second turnout switch movable guide are disposed at the turnout switch guide position.

[Claim 10]

The branching device according to any one of Claims 1 to 6, wherein

the movable device has

a first movable device that simultaneously moves the first main line movable guide and the first turnout

switch movable guide; and

a second movable device that is derivable independently from the first movable device, and simultaneously moves the second main line movable guide and the second turnout switch movable guide.

[Claim 11]

The branching device according to any one of Claims 1 to 10, wherein

the movable device has a switch.

[Claim 12]

A center guide-type guideway transportation system comprising:

the branching device according to any one of Claims 1 to 11;

the main line guideway that has a main line running path having a running surface contactable with the running wheels of the vehicle and extending in a first direction, and a main line guide disposed on a first virtual center line positioned at a center of the main line running path in a width direction to guide the vehicle; and

the turnout switch guideway that has a turnout switch running path extending in a second direction different from the first direction and having the running surface so as to

turnout off from the main line running path, and a turnout switch guide disposed on a second virtual center line positioned at a center of the turnout switch running path in the width direction to guide the vehicle.