Claims

1. A branching device which guides a track-based vehicle traveling between fixed rails in a center guide-type track-based transportation system, the transportation system being equipped with a traveling lane and the fixed rails disposed so as to sandwich a branching section at the center of the traveling lane in a width direction of the traveling lane, the branching device comprising:

a movable rail of which a first end is positioned at a position continuous to one of the fixed rails, which is supported so as to swing around the first end, and which can be switched between a guide position at which a second end of the movable rail opposite to the first end is continuous to the other of the fixed rails and a retracted position at which the second end is different in position from the other of the fixed rails in the traveling lane width direction;

an engagement member configured to be engaged with the movable rail at the guide position to restrain displacement of the movable rail; and

a locking action mechanism configured to activate the engagement member so as to change between a locked state in which the engagement member is engaged with the movable rail at the guide position and an unlocked state in which the engagement member is released from the movable rail.

2. The branching device according to Claim 1, the branching device further comprising

a switching mechanism by which the movable rail is allowed to move between the guide position and the retracted position, wherein

the locking action mechanism is provided with a conversion unit which converts a driving force of the switching mechanism to a driving force for activating the engagement member.

3. The branching device according to Claim 1, wherein

the locking action mechanism is provided with a driving source which activates the engagement member so as to change between the locked state and the unlocked state.

4. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is supported so as to move rotationally around a rotational axis extending from the other of the fixed rail to one of the fixed rail, and is provided with a pair of projections which are able to retain the movable rail at the guide position in the width direction of the traveling lane, and wherein

the locking action mechanism allows the engagement member to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which the pair of projections are retracted from the movable rail.

5. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the traveling lane width direction, and at least one of the projections is supported so as to move rotationally around the rotational axis extending in a direction moving from one of the fixed rails toward the other, and wherein

the locking action mechanism allows at least one of the projections to move rotationally, thereby activationg the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

6. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is supported so as to be movable in a vertical direction which is perpendicular to a traveling lane surface on which the track-based vehicle travels, and provided with a pair of projections which are capable of retaining the movable rail at the guide position in the traveling lane width direction, and wherein

the locking action mechanism allows the engagement member to move in the vertical direction, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which the pair of projections are retracted from the movable rail.

7. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the traveling lane width direction, and at least one of the projections is supported so as to be movable in a vertical direction perpendicular to a traveling lane surface on which the track-based vehicle travels, and wherein

the locking action mechanism allows at least one of the projections to move in the vertical direction, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

8. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is supported so as to move rotationally around a rotational axis extending in the traveling lane width direction, and is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the traveling lane width direction, and wherein

the locking action mechanism allows the engagement member to move rotationally around the rotational axis, thereby activating the engagement member so as

to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which the pair of projections are retracted from the movable rail.

9. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move rotationally around a rotational axis extending in the traveling lane width direction, and wherein

the locking action mechanism allows at least one of the projections to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

10. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is supported so as to move rotationally around a rotational axis extending in a vertical direction perpendicular to a traveling lane surface, and is provided with a pair of projections of which the interval is greater than the width of the movable rail in the traveling lane width direction, and wherein

the locking action mechanism allows the engagement member to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the pair of projections are in close to the movable rail at the guide position to retain the movable rail in the traveling lane width direction and the unlocked state in which the pair of projections are retracted from the movable rail.

11. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move in the traveling lane width direction, and wherein

the locking action mechanism allows at least one of the projections to move in the traveling lane width direction, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

12. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move in a direction moving toward one of the fixed rails from the other, and wherein

the locking action mechanism allows at least one of the projections to move in a direction moving toward one of the fixed rails from the other, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail toward the other of the fixed rails.

13. The branching device according to one of Claim 1 to Claim 3, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move rotationally around a rotational axis extending in a vertical direction perpendicular to a traveling lane surface of the track-based vehicle, and wherein

the locking action mechanism allows at least one of the projections to move rotationally, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

14. The branching device according to one of Claim 4 to Claim 13, wherein

at least one of the projections of the engagement member is such that a part thereof including a face opposing the movable rail in the locked state is formed of an elastic material.

15. The branching device according to one of Claim 4 to Claim 14, wherein

at least a part of the movable rail retained between the pair of projections at the guide position is formed as a curved part, and

the pair of projections of the engagement member is such that faces opposing the movable rail on retaining the movable rail positioned at the guide position are curved at a curvature in accordance with a curvature of the curved part.

16. The branching device according to one of Claim 1 to Claim 15, further comprising

a plurality of locking mechanisms provided with the engagement member and the locking action mechanism, wherein

the plurality of locking mechanisms are disposed along the movable rail positioned at the guide position.

17. The branching device according to one of Claim 5 to Claim 15, further comprising

at least one of locking mechanisms provided with the engagement member and the locking action mechanism, wherein

in the locked state, an end locking mechanism included in the locking mechanisms is positioned so as to engage with an end of the other of the fixed rails along with the second end of the movable rail at the guide position.

18. The branching device according to one of Claim 1 to Claim 16, wherein

the traveling lane is provided with a main line traveling lane and a branch line traveling lane which branches from the main line traveling lane,

the other of the fixed rails is a near-side main line rail which is a fixed rail of the main line traveling lane disposed on a near side in a traveling direction from a branch starting position at which the branch line traveling lane starts to branch from the main line traveling lane,

one of the fixed rails includes a forward-side main line rail which is a fixed rail of the main line traveling lane disposed via the branching section from the near-side main line rail along the main line traveling lane and a branch line rail which is a fixed rail of the branch line traveling lane disposed via the branching section from the main line traveling lane along the branch line traveling lane,

the movable rail is provided with a main line movable rail disposed at a position at which the first end is continuous to the forward-side main line rail and a branch line movable rail disposed at a position at which the first end is continuous to the branch line rail, and

the locking mechanism having the engagement member and the locking action mechanism is installed on each of the main line movable rail and the branch line movable rail.

19. The branching device according to Claim 17, wherein

the traveling lane is provided with a main line traveling lane and a branch line traveling lane which branches from the main line traveling lane,

the other of the fixed rails is a near-side main line rail which is a fixed rail of the main line traveling lane disposed on a near side in a traveling direction from a branch starting position at which the branch line traveling lane starts to branch from the main line traveling lane,

one of the fixed rails includes a forward-side main line rail which is a fixed rail of the main line traveling lane disposed via the branching section from the near-side main line rail along the main line traveling lane and a branch line rail which is a fixed rail of the branch line traveling lane disposed via the branching section from the near-side main line traveling lane along the branch line traveling lane,

the movable rail is provided with a main line movable rail disposed at a position at which the first end is continuous to the forward-side main line rail and a branch line movable rail disposed at a position at which the first end is continuous to the branch line rail, and

the engagement member of the end locking mechanism is such that the pair of projections undergo displacement by the locking action mechanism of the end locking mechanism, and the engagement member is installed at a position at which engagement is made not only with the second end of the main line movable rail at the guide position in the locked state but also with the end of the near-side main line rail and engagement is made not only with the second end of the branch line movable rail at the guide position but also with the end of the near-side main line rail.

20. A center guide-type track-based transportation system which is provided with the branching device according to one of Claim 1 to Claim 19, the traveling lane and the fixed rails.

Claims

1. A branching device which guides a track-based vehicle traveling between fixed rails in a center guide-type track-based transportation system, the transportation system being equipped with a traveling lane and the fixed rails disposed so as to sandwich a branching section at the center of the traveling lane in a width direction of the traveling lane, the branching device comprising:

a movable rail of which a first end is positioned at a position continuous to one of the fixed rails, which is supported so as to swing around the first end, and which can be switched between a guide position at which a second end of the movable rail opposite to the first end is continuous to the other of the fixed rails and a retracted position at which the second end is different in position from the other of the fixed rails in the width direction of the traveling lane;

an engagement member configured to be engaged with the movable rail at the guide position to restrain displacement of the movable rail;

a locking action mechanism configured to activate the engagement member so as to change between a locked state in which the engagement member is engaged with the movable rail at the guide position and an unlocked state in which the engagement member is released from the movable rail, and

a switching mechanism by which the movable rail is allowed to move between the guide position and the retracted position, wherein

the locking action mechanism is provided with a conversion unit which converts a driving force of the switching mechanism to a driving force for activating the engagement member.

2. The branching device according to Claim 1, wherein

the engagement member is supported so as to move rotationally around a rotational axis extending from the other of the fixed rail to one of the fixed rail, and is provided with a pair of projections which are able to retain the movable rail at the guide position in the width direction of the traveling lane, and wherein

the locking action mechanism allows the engagement member to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which the pair of projections are retracted from the movable rail.

3. The branching device according to Claim 1, wherein

the engagement member is supported so as to move rotationally around a rotational axis extending in the width direction of the traveling lane, and is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and wherein

the locking action mechanism allows the engagement member to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which the pair of projections are retracted from the movable rail.

4. The branching device according to Claim 1, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move rotationally around a rotational axis extending in the width direction of the traveling lane, and wherein

the locking action mechanism allows at least one of the projections to move rotationally around the rotational axis, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

5. The branching device according to Claim 1, wherein

the engagement member is provided with a pair of projections which are capable of retaining the movable rail at the guide position in the width direction of the traveling lane, and at least one of the projections is supported so as to move in the width direction of the traveling lane, and wherein

the locking action mechanism allows at least one of the projections to move in the width direction of the traveling lane, thereby activating the engagement member so as to change between the locked state in which the movable rail is retained between the pair of projections and the unlocked state in which at least one of the projections is retracted from the movable rail.

6. The branching device according to one of Claim 2 to Claim 5, wherein

at least one of the projections of the engagement member is such that a part thereof including a face opposing the movable rail in the locked state is formed of an elastic material.

7. The branching device according to one of Claim 2 to Claim 6, wherein

at least a part of the movable rail retained between the pair of projections at the guide position is formed as a curved part, and

the pair of projections of the engagement member is such that faces opposing the movable rail on retaining the movable rail positioned at the guide position are curved at a curvature in accordance with a curvature of the curved part.

8. The branching device according to one of Claim 1 to Claim 7, further comprising

a plurality of locking mechanisms provided with the engagement member and the locking action mechanism, wherein

the plurality of locking mechanisms are disposed along the movable rail positioned at the guide position.

9. The branching device according to one of Claim 3 to Claim 7, further comprising

at least one of locking mechanisms provided with the engagement member and the locking action mechanism, wherein

in the locked state, an end locking mechanism included in the locking mechanisms is positioned so as to engage with an end of the other of the fixed rails along with the second end of the movable rail at the guide position.

10. The branching device according to one of Claim 1 to Claim 8, wherein

the traveling lane is provided with a main line traveling lane and a branch line traveling lane which branches from the main line traveling lane,

the other of the fixed rails is a near-side main line rail which is a fixed rail of the main line traveling lane disposed on a near side in a traveling direction from a branch starting position at which the branch line traveling lane starts to branch from the main line traveling lane,

one of the fixed rails includes a forward-side main line rail which is a fixed rail of the main line traveling lane disposed via the branching section from the near-side main line rail along the main line traveling lane and a branch line rail which is a fixed rail of the branch line traveling lane disposed via the branching section from the main line traveling lane along the branch line traveling lane,

the movable rail is provided with a main line movable rail disposed at a position at which the first end is continuous to the forward-side main line rail and a branch line movable rail disposed at a position at which the first end is continuous to the branch line rail, and

the locking mechanism having the engagement member and the locking action mechanism is installed on each of the main line movable rail and the branch line movable rail.

11. The branching device according to Claim 9, wherein

the traveling lane is provided with a main line traveling lane and a branch line traveling lane which branches from the main line traveling lane,

the other of the fixed rails is a near-side main line rail which is a fixed rail of the main line traveling lane disposed on a near side in a traveling direction from a branch starting position at which the branch line traveling lane starts to branch from the main line traveling lane,

one of the fixed rails includes a forward-side main line rail which is a fixed rail of the main line traveling lane disposed via the branching section from the near-side main line rail along the main line traveling lane and a branch line rail which is a fixed rail of the branch line traveling lane disposed via the branching section from the near-side main line traveling lane along the branch line traveling lane,

the movable rail is provided with a main line movable rail disposed at a position at which the first end is continuous to the forward-side main line rail and a branch line movable rail disposed at a position at which the first end is continuous to the branch line rail, and

the engagement member of the end locking mechanism is such that the pair of projections undergo displacement by the locking action mechanism of the end locking mechanism, and the engagement member is installed at a position at which engagement is made not only with the second end of the main line movable rail at the guide position in the locked state but also with the end of the near-side main line rail and engagement is made not only with the second end of the branch line movable rail at the guide position but also with the end of the near-side main line rail.

12. A center guide-type track-based transportation system which is provided with the branching device according to one of Claim 1 to Claim 11, the traveling lane and the fixed rails.