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(54) **RAILWAY VEHICLE**

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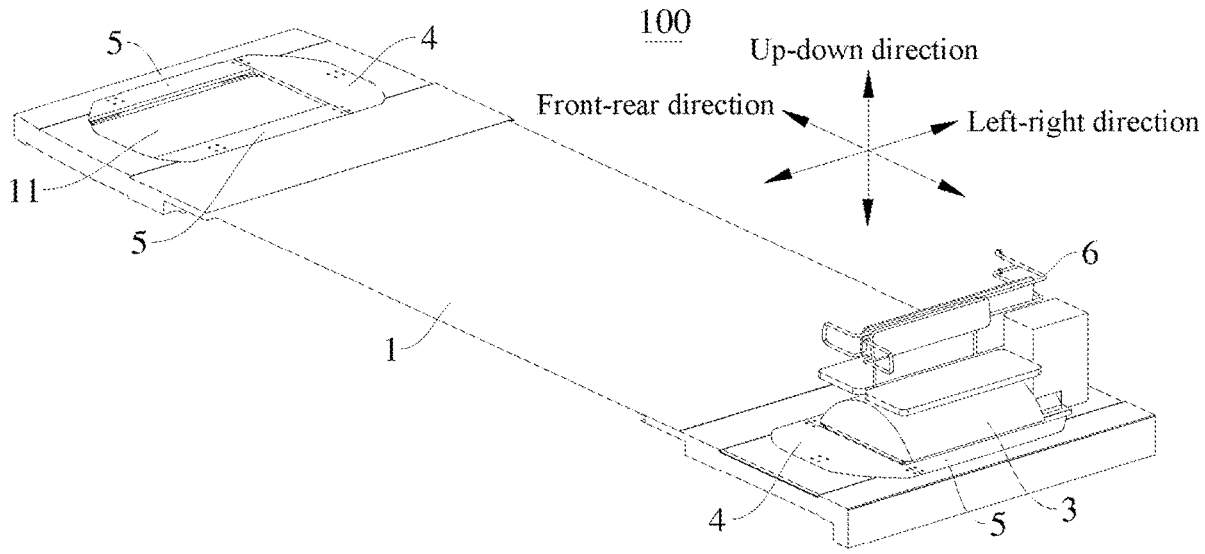
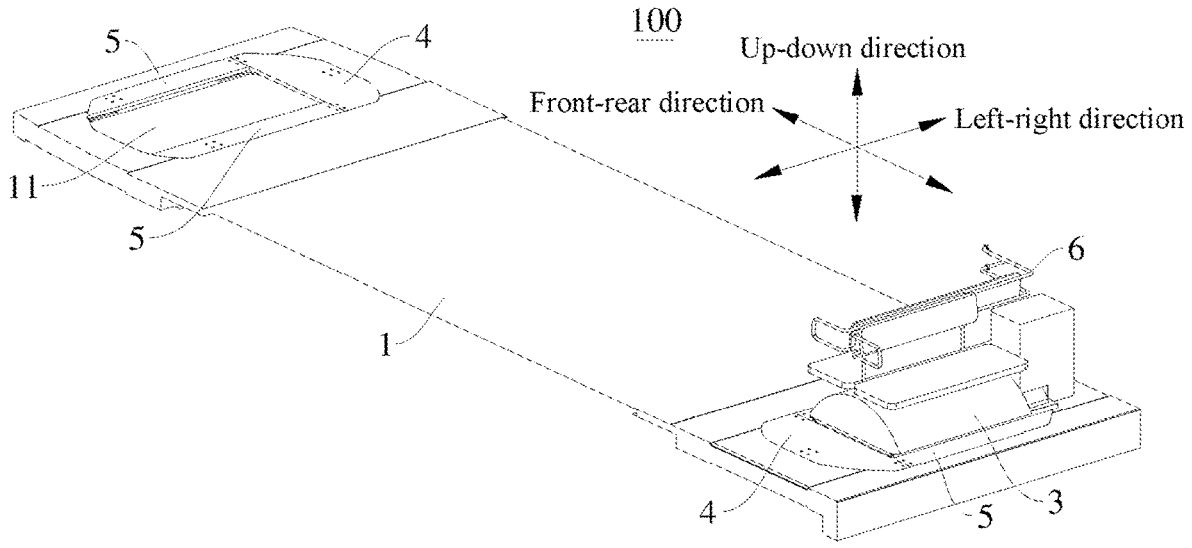
(57) **ABSTRACT**

A railway vehicle is provided, including: a floor, where an opening portion is provided on the floor, two wheel removal and mounting floor panels are disposed in the opening portion, a sub-opening portion is defined between the two wheel removal and mounting floor panels, a wheel is disposed at the sub-opening portion, a part of the wheel passes through the sub-opening portion and protrudes from an upper surface of the floor, the two wheel removal and mounting floor panels are respectively located on two sides of the wheel in a radial direction, and both the two wheel removal and mounting floor panels are detachably connected to the floor; and a wheel cover, covering an upper side of the wheel, and being connected to the two wheel removal and mounting floor panels.

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Left-right direction
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FIG. 1

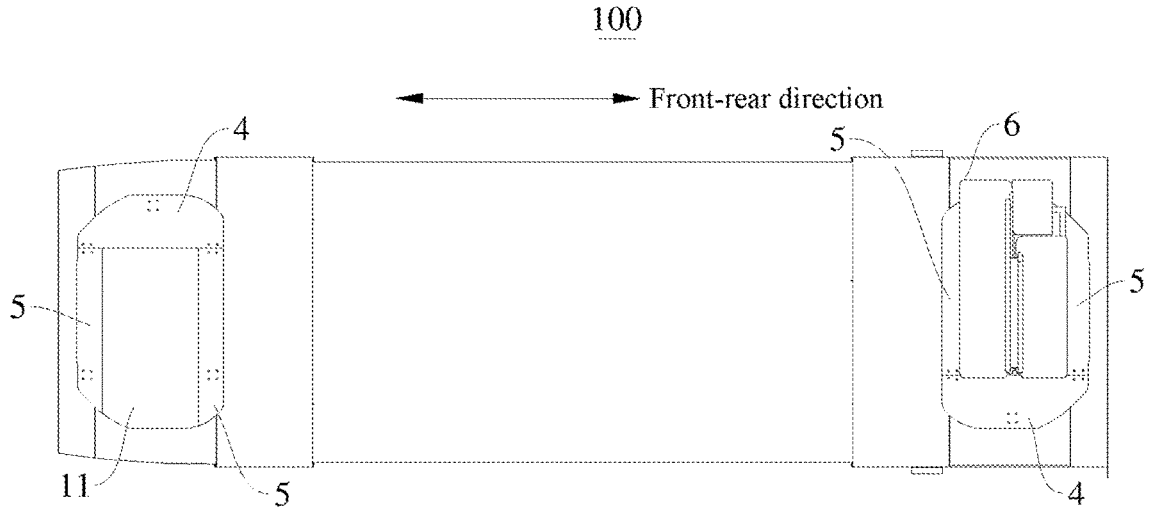
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FIG. 2

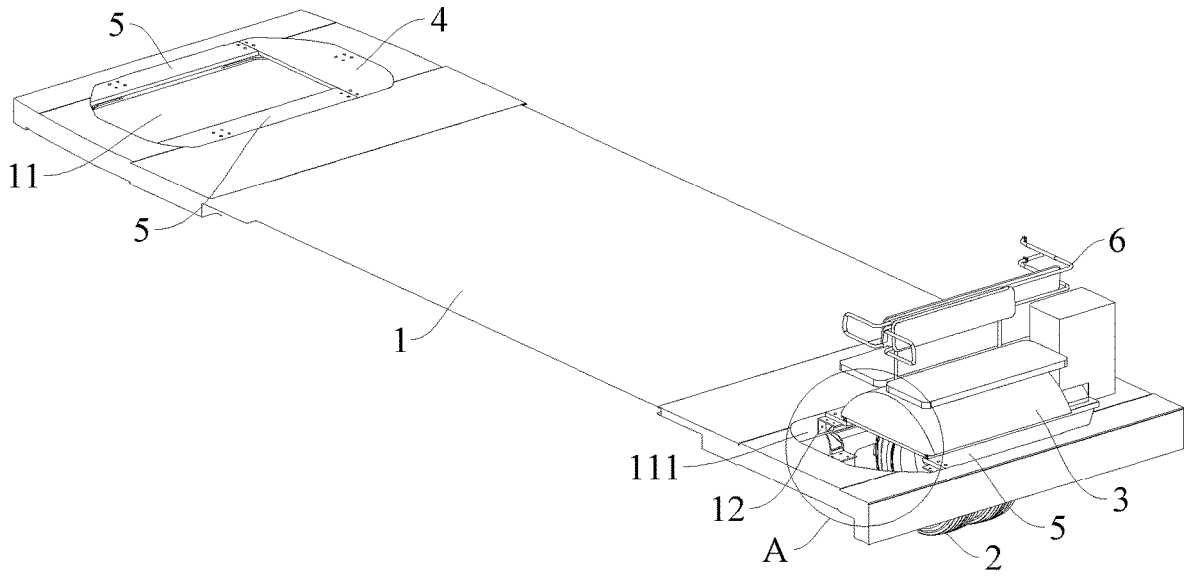

FIG. 3

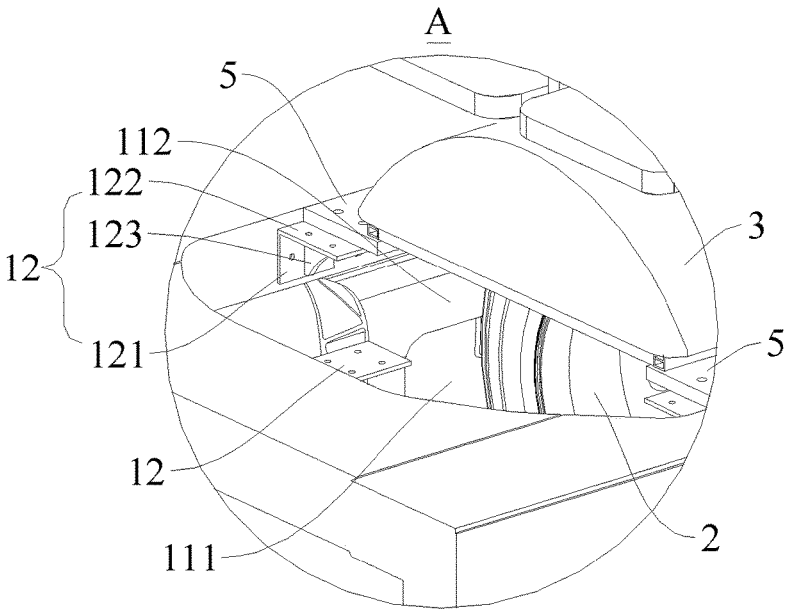

FIG. 4

FIG. 5

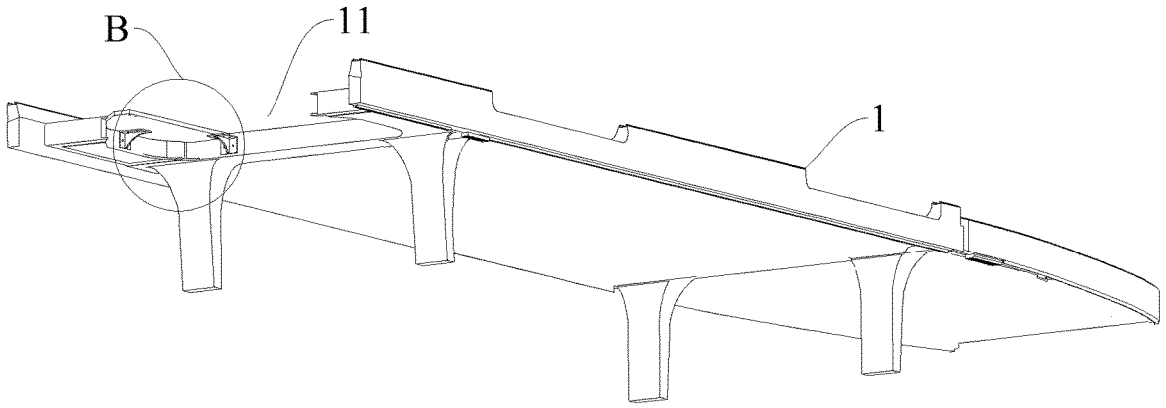

FIG. 6

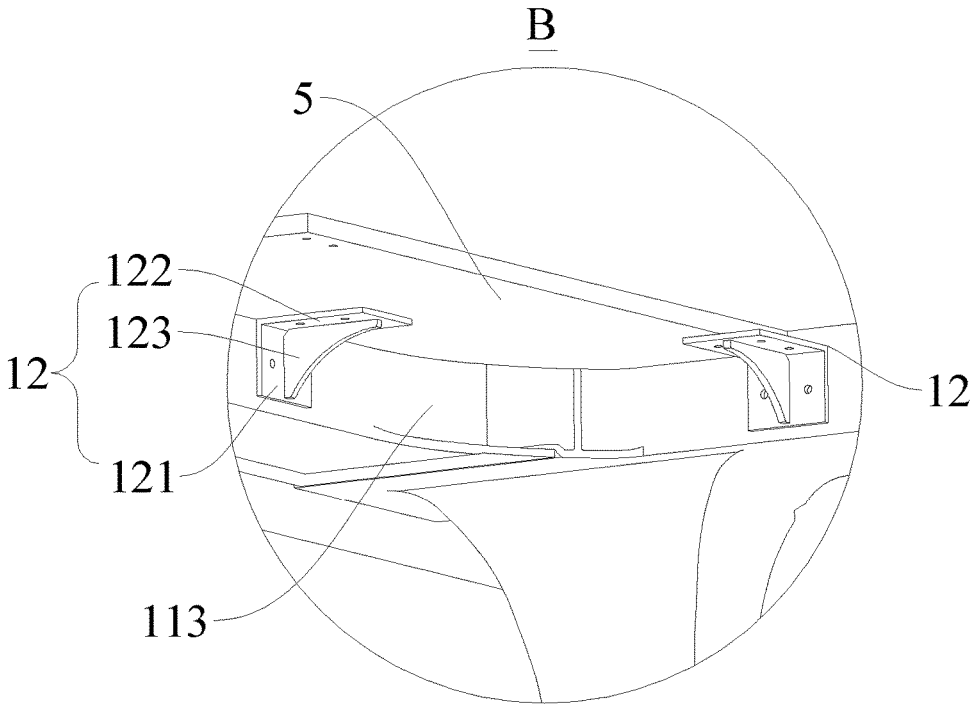

FIG. 7

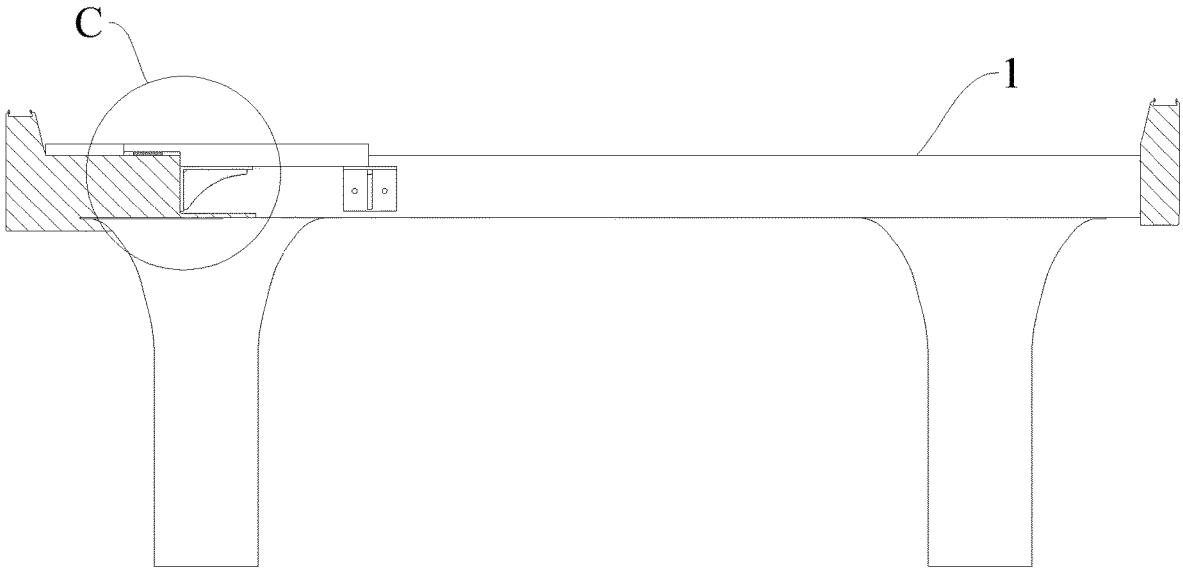

FIG. 8

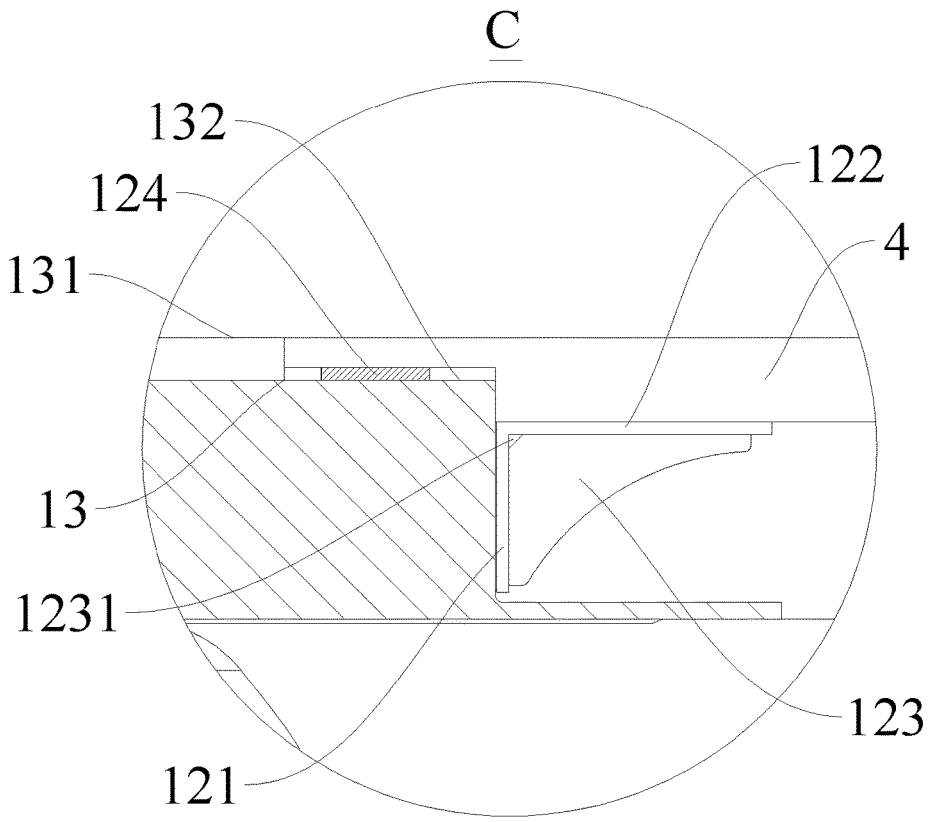

FIG. 9

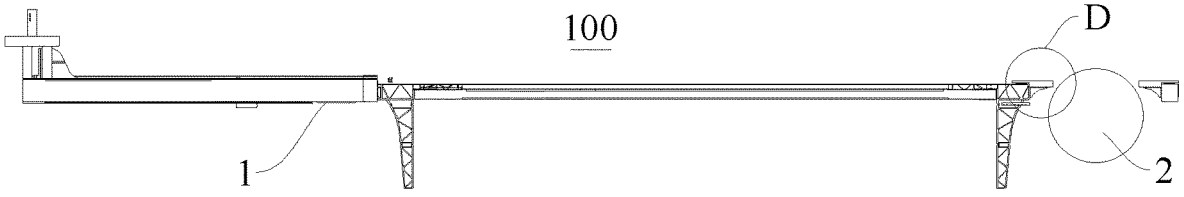

FIG. 10

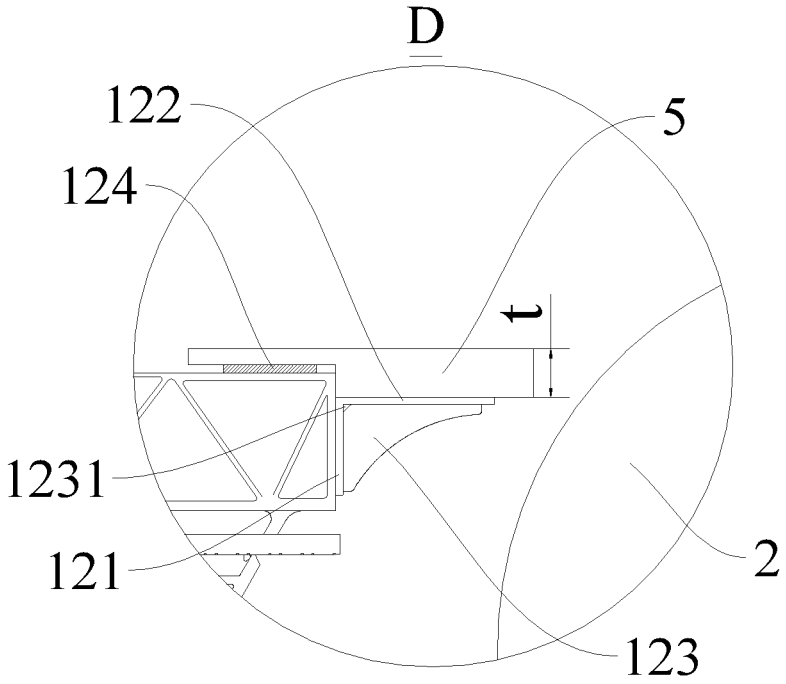

FIG. 11

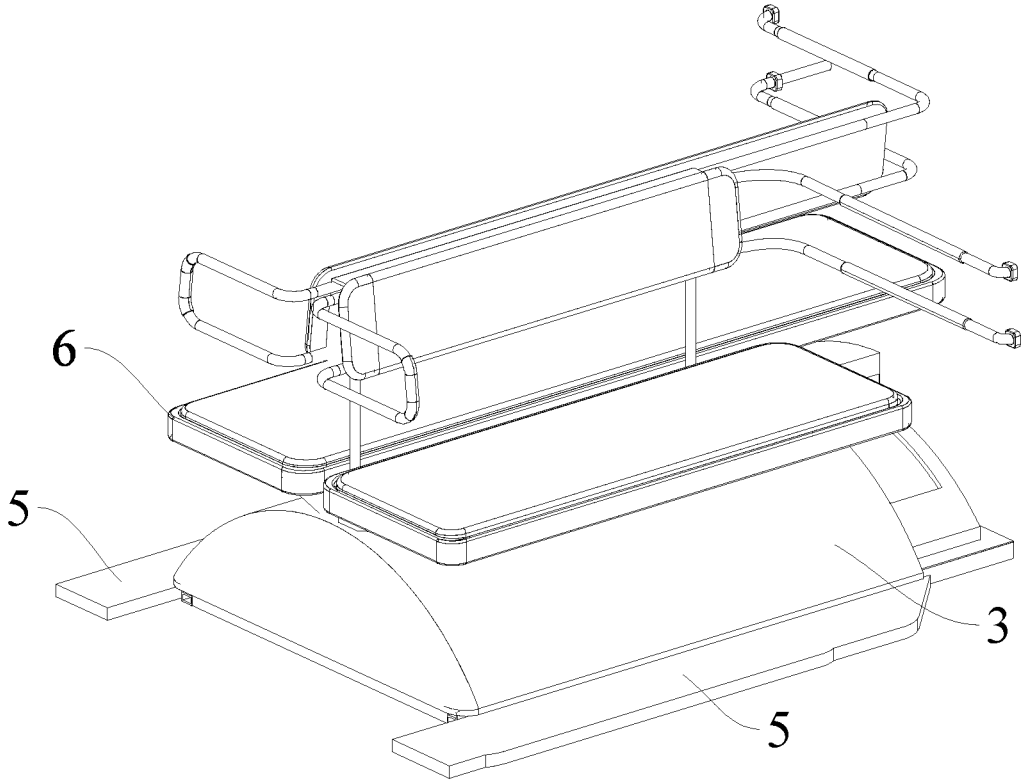

FIG. 12

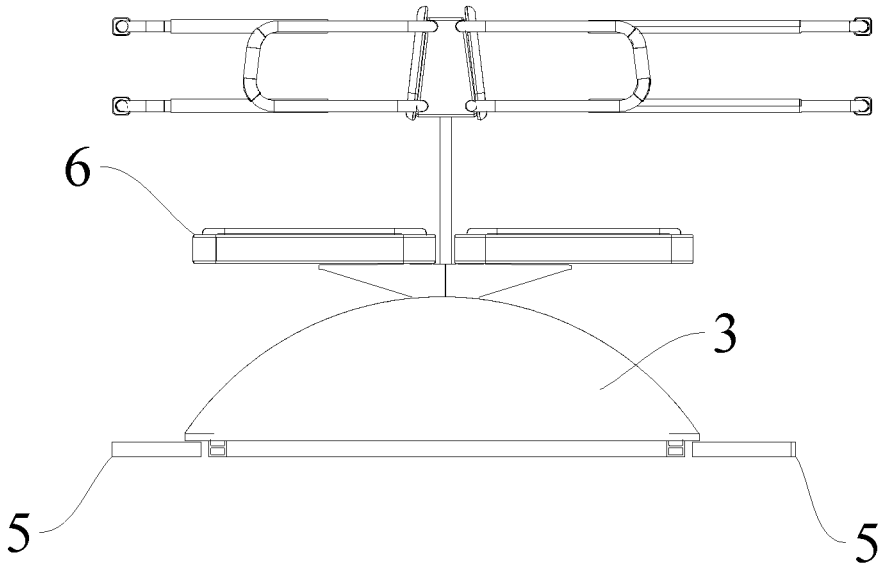

FIG. 13

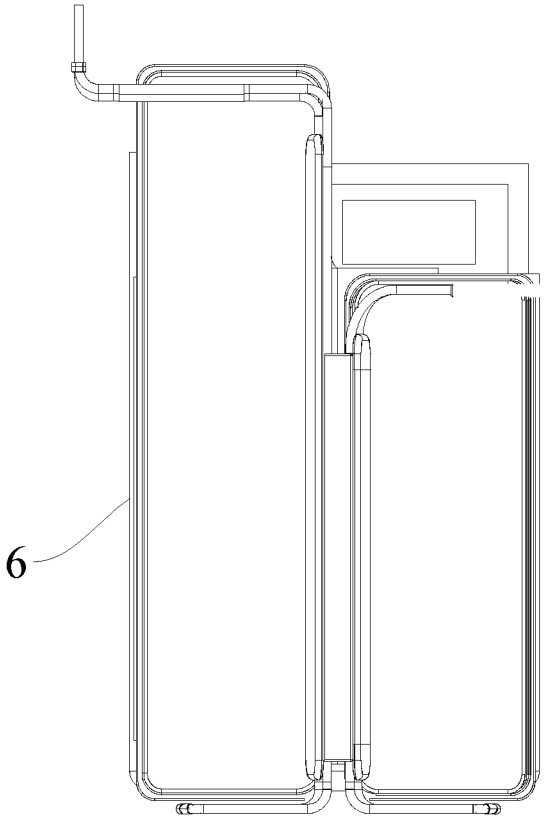

FIG. 14

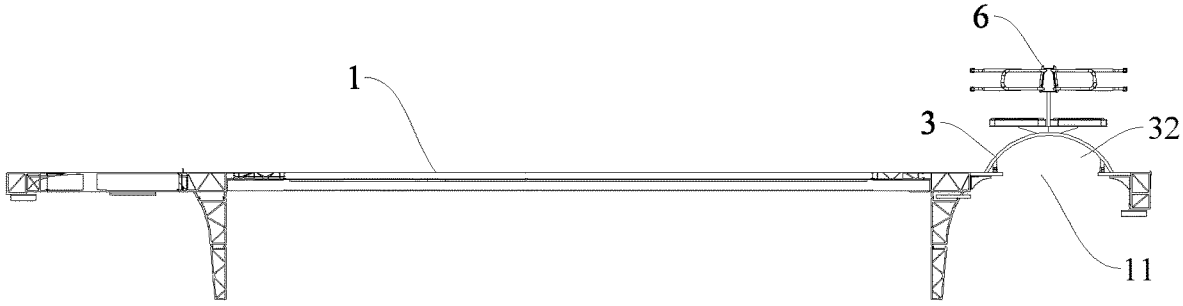

FIG. 15

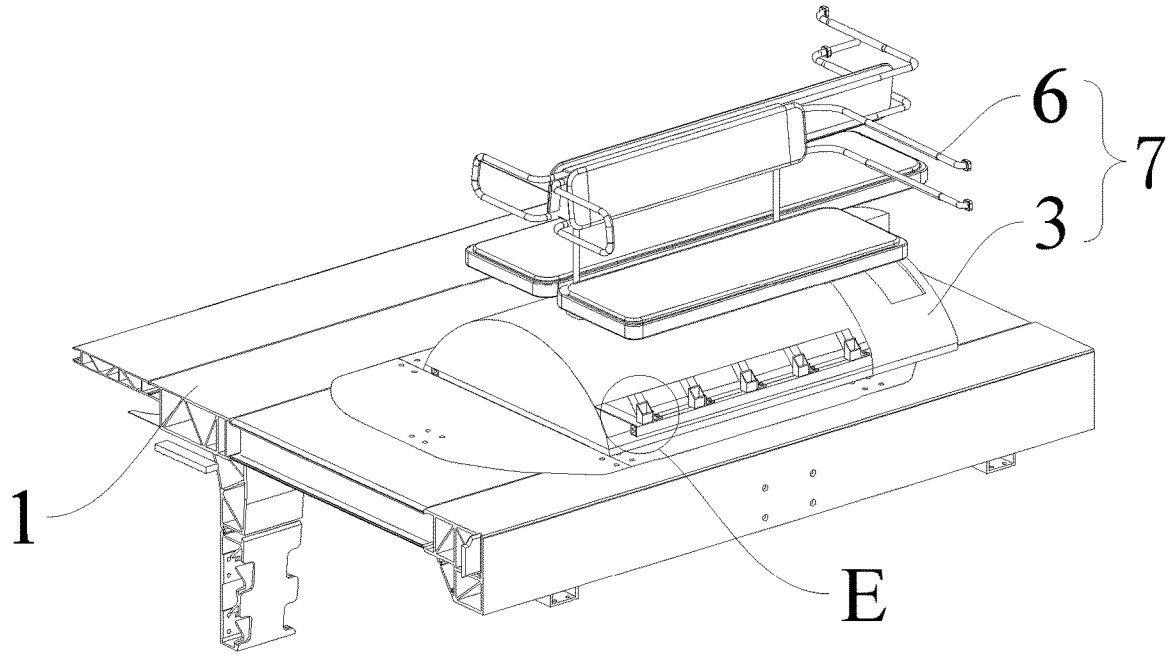

FIG. 16

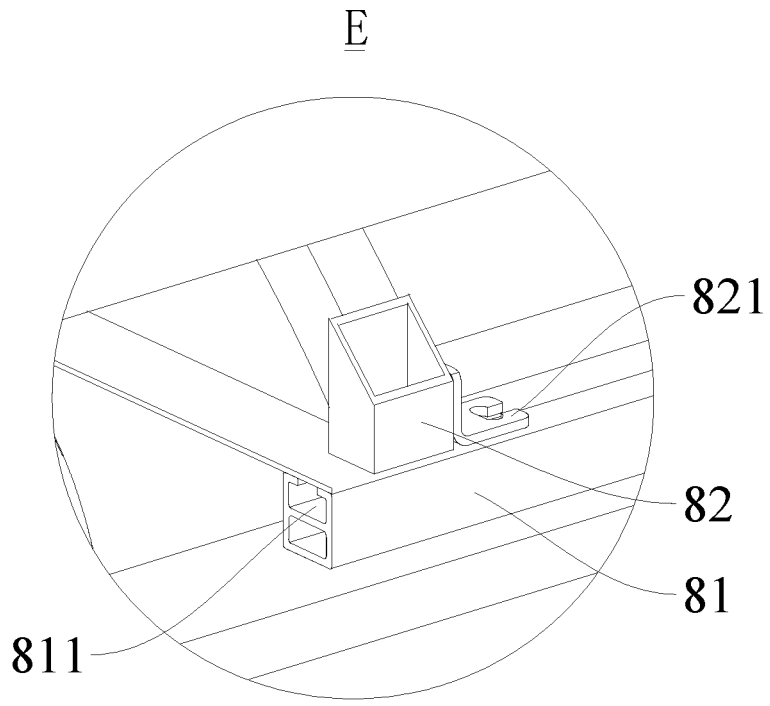

FIG. 17

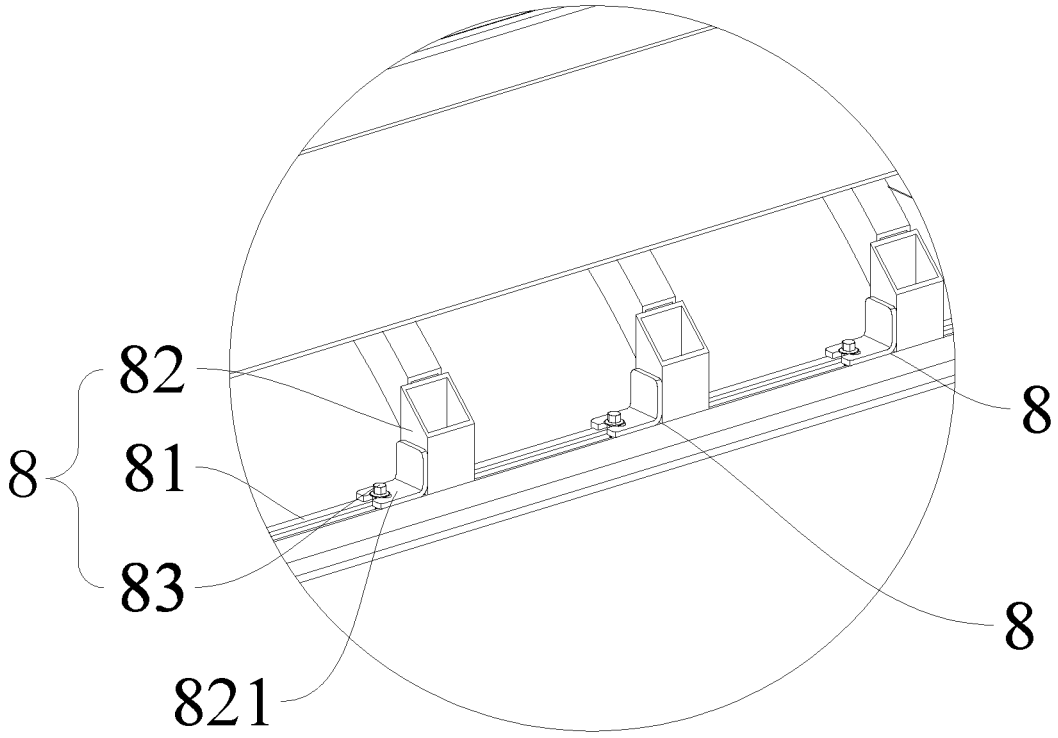

FIG. 18

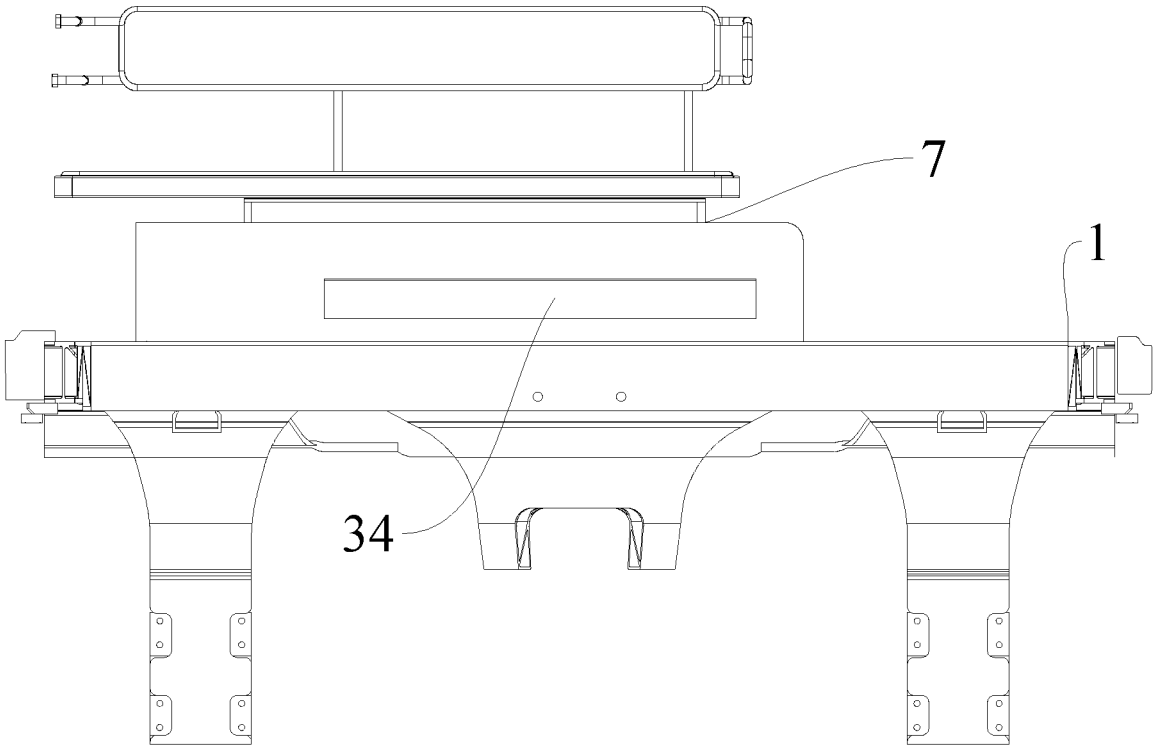

FIG. 19

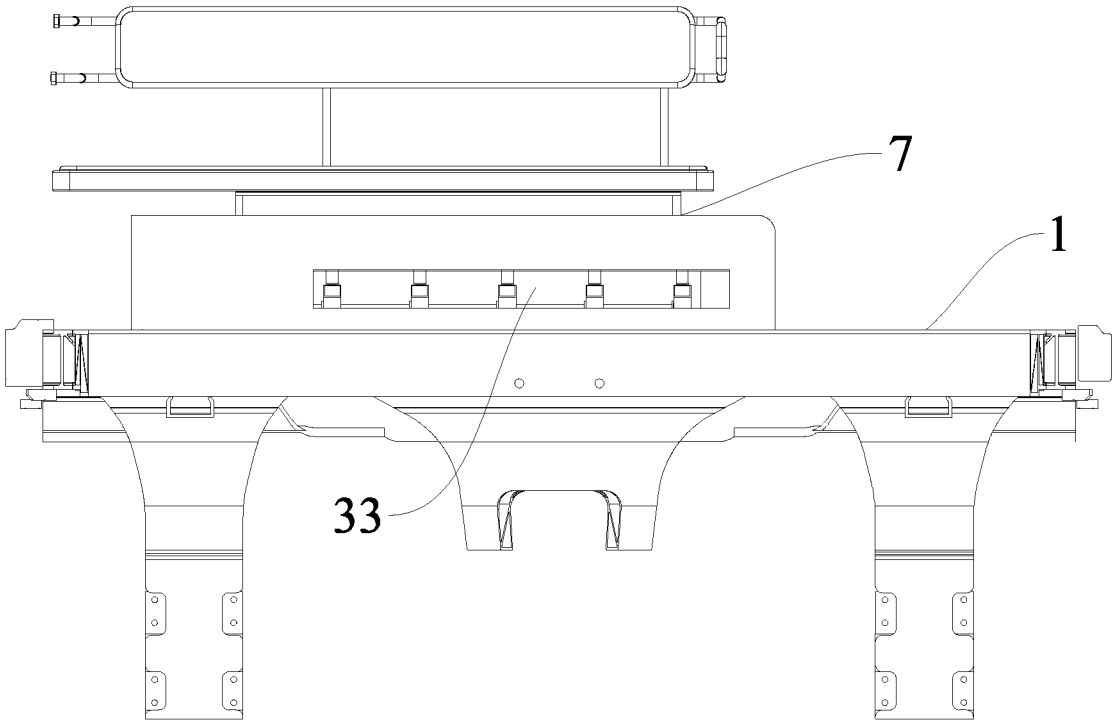

FIG. 20

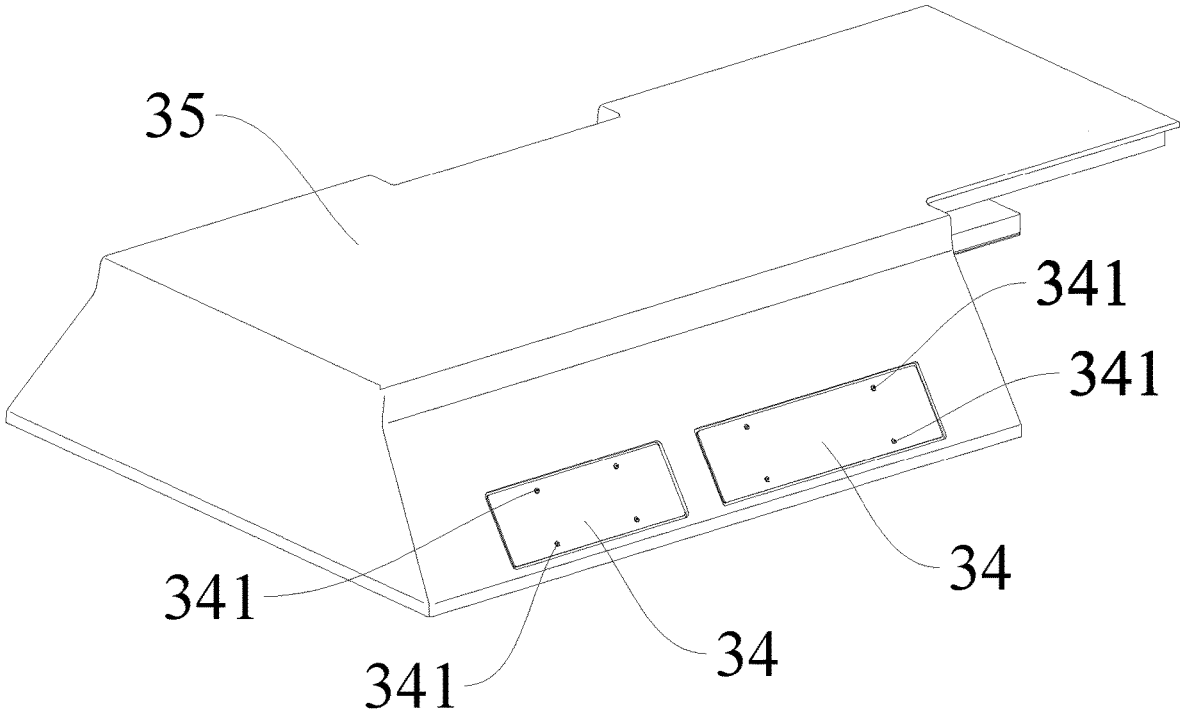

FIG. 21

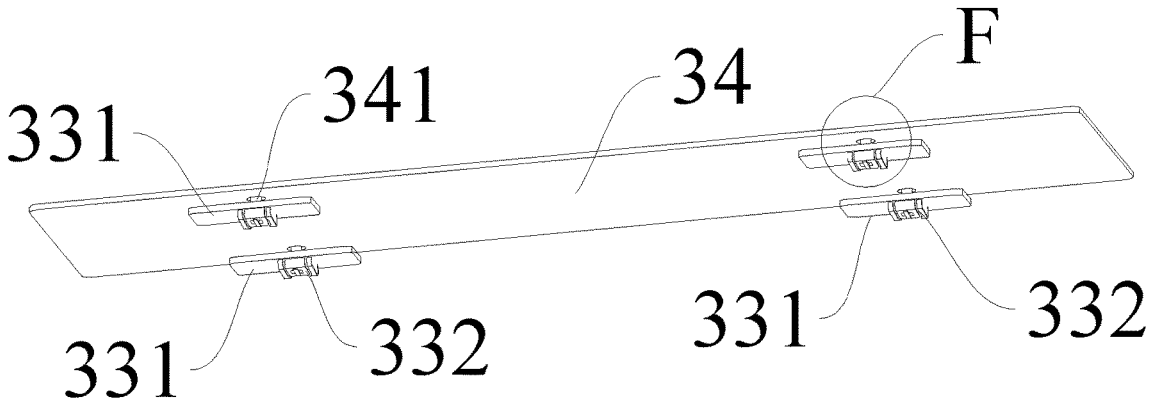

FIG. 22

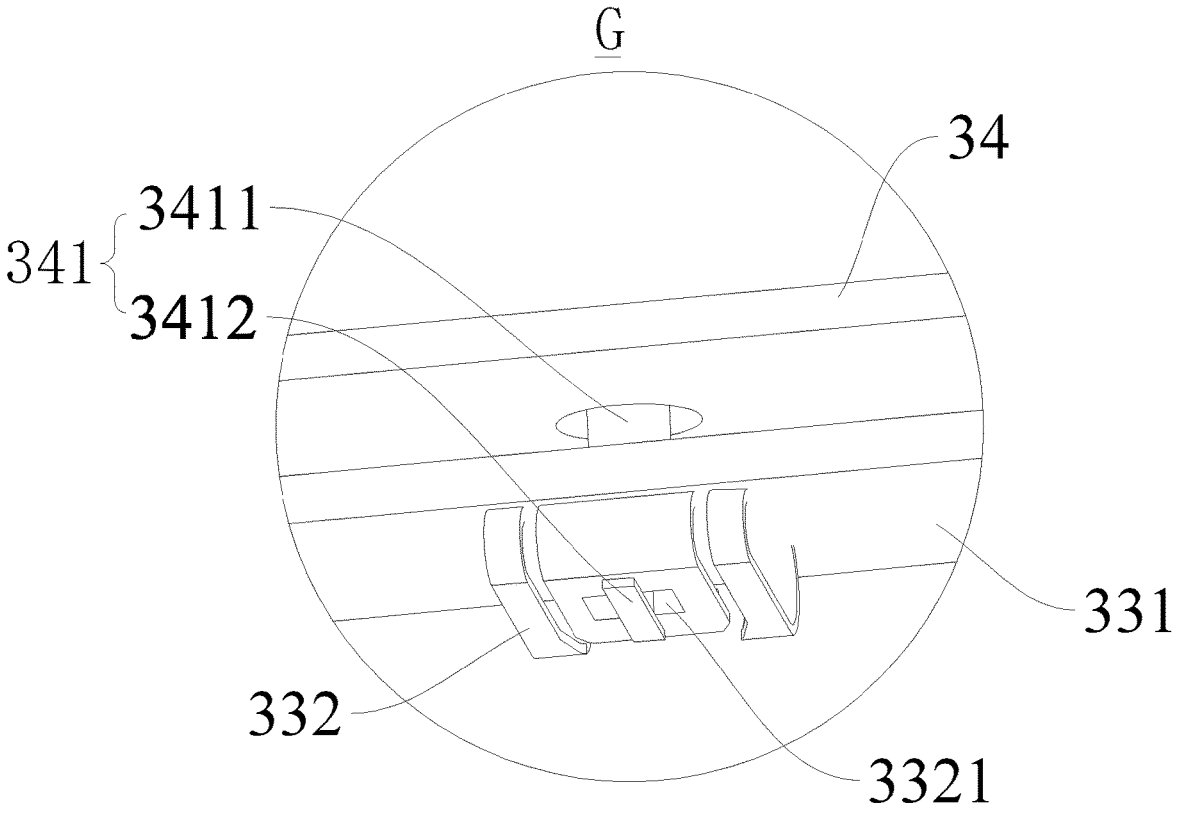
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FIG. 23

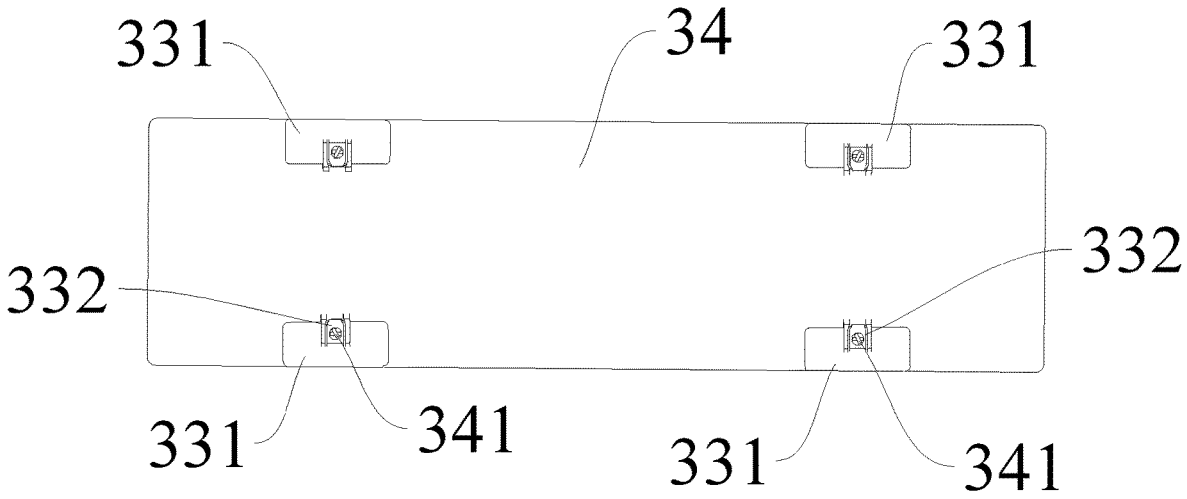
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FIG. 24

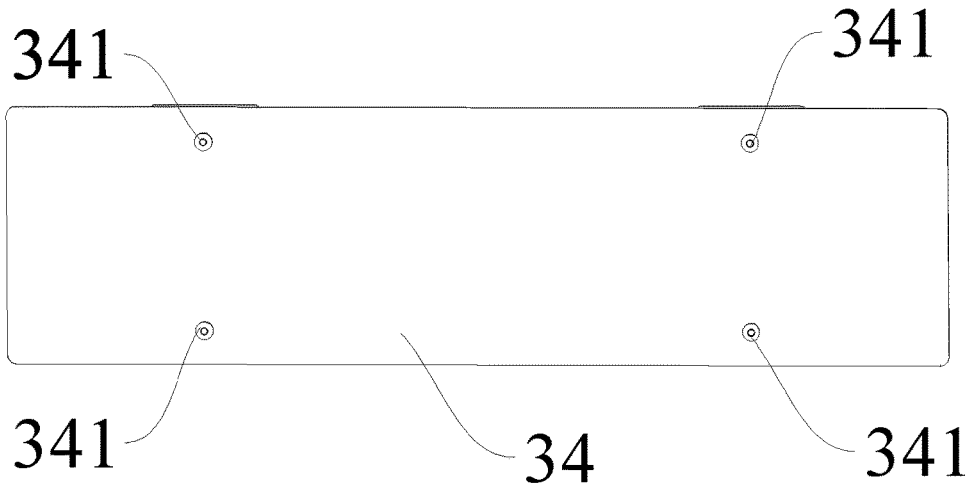

FIG. 25

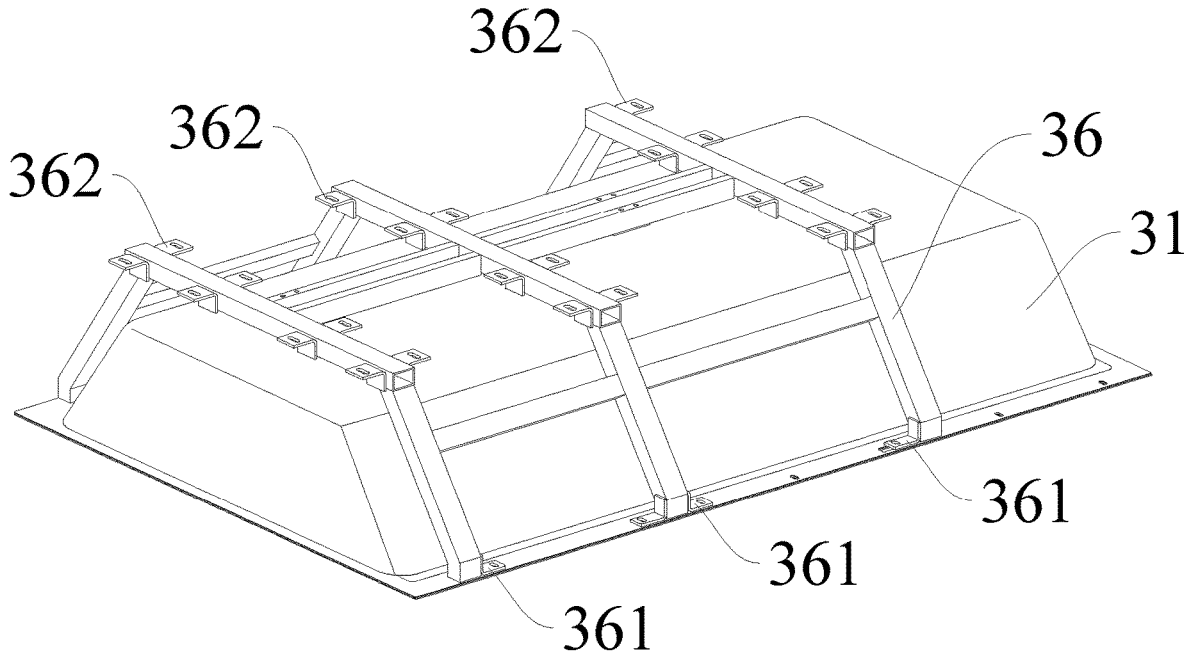

FIG. 26

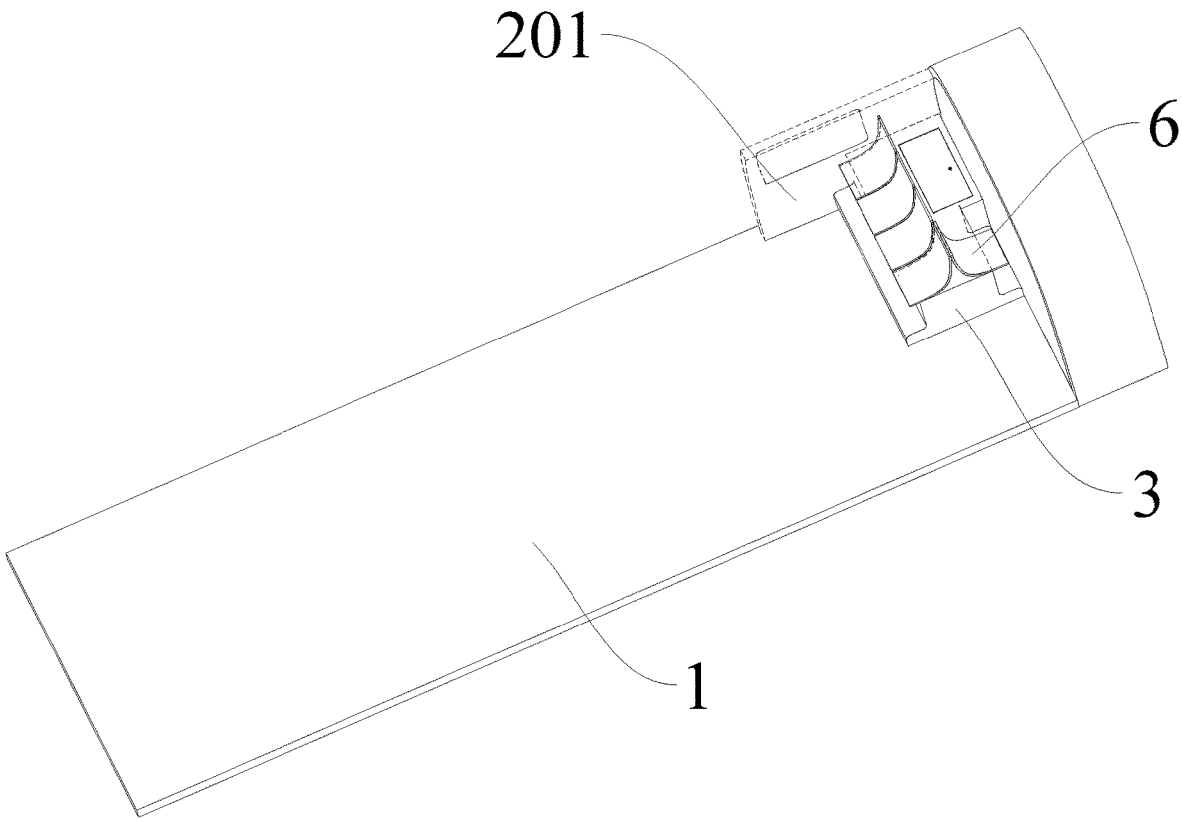

FIG. 27

RAILWAY VEHICLE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The application claims priority to Chinese Patent Application No. 201910944390.0 filed by BYD Co., Ltd. on Sep. 30, 2019 and entitled "RAILWAY VEHICLE".

FIELD

[0002] The present disclosure relates to the field of rail transport technologies, and in particular, to a railway vehicle.

BACKGROUND

[0003] In the related art, in order to remove or maintain a walking wheel on a straddle-type monorail vehicle, a bogie is first separated from a vehicle body by using a large bogie separation device, and then a wheel change operation is performed under the vehicle body. During the operation, the vehicle body and the bogie need to be lifted to be higher than a rail beam surface, to meet a space requirement for changing the wheel. In addition, a large quantity of bundles and pipes connected to the bogie need to be removed and remounted with a large workload and low efficiency.

[0004] In some other related arts, a detachable wheel cover that occupies a large space and is heavy is disposed above the walking wheel of the straddle-type monorail vehicle. When the walking wheel is removed or maintained, an electric appliance cabinet cover and a dustproof cover of the wheel cover need to be first removed, which is complicated in removal steps and takes a long time. Moreover, in order to facilitate the removal of the walking wheel, a floor of the vehicle body has a large space reserved for the walking wheel, and a sound insulation effect needs to be improved.

SUMMARY

[0005] An objective of the present disclosure is to at least resolve one of the technical problems in the related art to some extent.

[0006] To this end, an objective of the present disclosure is to provide a railway vehicle with a small occupied space of a wheel cover and a light weight. In addition, a wheel space reserved on a floor is relatively small, a sound insulation effect is good, and a wheel can be quickly removed and mounted.

[0007] The railway vehicle according to embodiments of the present disclosure includes: a floor, where an opening portion is provided on the floor, two wheel removal and mounting floor panels are disposed in the opening portion, a sub-opening portion is defined between the two wheel removal and mounting floor panels, a wheel is disposed at the sub-opening portion, a part of the wheel passes through the sub-opening portion and protrudes from an upper surface of the floor, the two wheel removal and mounting floor panels are respectively located on two sides of the wheel in a radial direction, and both the two wheel removal and mounting floor panels are detachably connected to the floor; and a wheel cover, covering an upper side of the wheel, and being connected to the two wheel removal and mounting floor panels.

[0008] According to the railway vehicle provided in the embodiments of the present disclosure, two detachable wheel removal and mounting floor panels located on two sides of a wheel in a radial direction are disposed, a part of the wheel may pass through a sub-opening portion between the two wheel removal and mounting floor panels, and a wheel cover is connected to the two wheel removal and mounting floor panels, so that an area of the entire floor is increased and an occupied space of the wheel cover can be relatively reduced, to reduce a weight of the wheel cover. Removal and installation of wheel in the vehicle can ensure realized, a weight of the railway vehicle is reduced, the performance of the railway vehicle is improved, and a wheel space reserved on a vehicle body is reduced, thereby reducing noise in the vehicle and improving comfort of seat for passengers.

[0009] According to some embodiments of the present disclosure, a central axis of the wheel is lower than the floor, and a distance between the two wheel removal and mounting floor panels is less than a diameter of the wheel in a length direction of the floor.

[0010] According to some embodiments of the present disclosure, a maximum width of the opening portion is greater than the diameter of the wheel in the length direction of the floor.

[0011] According to some embodiments of the present disclosure, a step structure is disposed on an edge of the floor located at the opening portion, and one side of each wheel removal and mounting floor panel away from the wheel is disposed on the step structure and is flush with the upper surface of the floor.

[0012] According to some embodiments of the present disclosure, a sealing member is disposed between each wheel removal and mounting floor panel and the floor.

[0013] According to some embodiments of the present disclosure, a seat is disposed on the wheel cover.

[0014] According to some embodiments of the present disclosure, at least two fixed supports are disposed on a side wall of the opening portion, each wheel removal and mounting floor panel is supported on an upper surface of at least one fixed support, and each wheel removal and mounting floor panel is detachably connected to the at least one fixed support.

[0015] According to some embodiments of the present disclosure, each fixed support includes: a fixed portion, being connected to the side wall of the opening portion; and a support portion, where one end of the support portion is fixedly connected to the top of the fixed portion, the other end of the support portion horizontally extends toward the wheel, the wheel removal and mounting floor panel is supported on an upper surface of the support portion, and the wheel removal and mounting floor panel is detachably connected to the support portion.

[0016] According to some embodiments of the present disclosure, the upper surface of the support portion is lower than the upper surface of the floor and a distance between the upper surface of the support portion and the upper surface of the floor is equal to a thickness of the wheel removal and mounting floor panel.

[0017] According to some embodiments of the present disclosure, each fixed support further includes: at least one reinforcing rib, being connected between a lower surface of the support portion and a surface on one side of the fixed portion adjacent to the wheel.

[0018] According to some embodiments of the present disclosure, an avoiding opening is formed in the reinforcing

rib and the avoiding opening is located at a joint between the support portion and the fixed portion.

[0019] According to some embodiments of the present disclosure, the thickness of each wheel removal and mounting floor panel is t, and t meets 30 mm≤t≤50 mm.

[0020] The additional aspects and advantages of the present disclosure will be provided in the following description, some of which will become apparent from the following description or may be learned from practices of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The foregoing and/or additional aspects and advantages of the present disclosure will become apparent and comprehensible from the following descriptions of the embodiments with reference to the accompanying drawings, where:

[0022] FIG. **1** is a perspective view of a railway vehicle before a wheel removal and mounting floor panel is disassembled according to an embodiment of the present disclosure.

[0023] FIG. **2** is a top view of the railway vehicle shown in FIG. **1**.

[0024] FIG. **3** is a perspective view of a railway vehicle after a wheel removal and mounting floor panel is removed according to an embodiment of the present disclosure.

[0025] FIG. **4** is an enlarged view of a part A in a circle in FIG. **3**.

[0026] FIG. **5** is a top view of the railway vehicle shown in FIG. **3**.

[0027] FIG. **6** is another perspective view of the railway vehicle shown in FIG. **1**, where a wheel cover is not shown.

[0028] FIG. **7** is an enlarged view of a part B in a circle in FIG. **6**.

[0029] FIG. **8** is a main view of the railway vehicle shown in FIG. **6**.

[0030] FIG. **9** is an enlarged view of a part C in a circle in FIG. **8**.

[0031] FIG. **10** is a side view of a railway vehicle according to an embodiment of the present disclosure, where a wheel cover and a seat are not shown.

[0032] FIG. **11** is an enlarged view of a part D in a circle in FIG. **10**.

[0033] FIG. **12** is a perspective view in which two wheel removal and mounting floor panels, a wheel cover, and a seat are assembled according to an embodiment of the present disclosure.

[0034] FIG. **13** is a side view of two overhauling floor panels, the wheel cover, and the seat shown in FIG. **12**.

[0035] FIG. **14** is a top view of two overhauling floor panels, the wheel cover, and the seat shown in FIG. **12**.

[0036] FIG. **15** is a cross-sectional view of a railway vehicle according to an embodiment of the present disclosure.

[0037] FIG. **16** is a perspective view in which a wheel cover and a seat are assembled according to an embodiment of the present disclosure.

[0038] FIG. **17** is an enlarged view of a part E in a circle in FIG. **16**.

[0039] FIG. **18** is a schematic diagram in which a wheel cover and seat assembly and a floor are assembled by using a bolt structure according to an embodiment of the present disclosure.

[0040] FIG. **19** is a main view of the railway vehicle shown in FIG. **16**.

[0041] FIG. **20** is another main view of the railway vehicle shown in FIG. **16**, where a sealing plate is in an open state.

[0042] FIG. **21** is a schematic diagram in which a wheel cover and a sealing plate are assembled according to an embodiment of the present disclosure.

[0043] FIG. **22** is a schematic diagram in which the sealing plate and a mounting plate are assembled shown in FIG. **21**.

[0044] FIG. **23** is an enlarged view of a part F in a circle in FIG. **22**.

[0045] FIG. **24** is a schematic diagram in which the sealing plate and the mounting plate are assembled shown in FIG. **22** from another perspective.

[0046] FIG. **25** is a schematic diagram in which the sealing plate and the mounting plate are assembled shown in FIG. **22** from still another perspective.

[0047] FIG. **26** is a schematic diagram of a dustproof cover and a wheel cover frame of the wheel cover shown in FIG. **21**, where a wheel cover outer cover is shown.

[0048] FIG. **27** is a schematic diagram of a railway vehicle according to an embodiment of the present disclosure.

REFERENCE NUMERALS

[0049] Railway vehicle **100**;

[0050] Floor **1**; Opening portion **11**; Wheel access panel **111**; Wheel mounting opening **112**;

[0051] Side wall **113** of an opening portion;

[0052] Fixed support **12**; Fixed portion **121**; Support portion **122**;

[0053] Reinforcing rib **123**; Avoiding opening **1231**; Sealing member **124**;

[0054] Step structure **13**; First upper surface **131**; Second upper surface **132**;

[0055] Wheel **2**; Wheel cover **3**; Dustproof cover **31**;

[0056] Accommodating space **32**; Wheel cover mounting opening **33**; Mounting plate **331**; Locking structure **332**; Elongated hole **3321**;

[0057] Sealing plate **34**; Fastener **341**; Rod portion **3411**; End portion **3412**;

[0058] Wheel cover outer cover **35**; Wheel cover frame **36**; Dustproof cover connecting plate **361**; Wheel cover outer cover connecting plate **362**;

[0059] Overhauling floor panel **4**; Wheel removal and mounting floor panel **5**; Seat **6**; Wheel cover and seat assembly **7**;

[0060] Bolt structure **8**; First connecting member **81**; C-shaped groove **811**;

[0061] Second connecting member **82**; Bolt connecting plate **821**;

[0062] Bolt **83**; and

[0063] Spacer **201**.

DETAILED DESCRIPTION

[0064] The embodiments of the present disclosure are described below in detail. Examples of the embodiments are shown in the accompanying drawings, and same or similar reference signs in all the accompanying drawings indicate same or similar components or components having same or similar functions. The embodiments described below with reference to the accompanying drawings are exemplary, and are intended to explain the present disclosure and cannot be construed as a limitation to the present disclosure.

[0065] The following describes a railway vehicle **100** according to the embodiments of the present disclosure with reference to FIG. **1** to FIG. **27**. The railway vehicle **100** is a straddle-type monorail vehicle (not shown in the figure). In the following description of this application, take the railway vehicle **100** as the straddle-type monorail vehicle as an example. Certainly, a person skilled in the art may understand that, the railway vehicle **100** is another type of railway vehicle, which is not limited to the straddle-type monorail vehicle.

[0066] As shown in FIG. **1** to FIG. **27**, the railway vehicle **100** according to an embodiment of a first aspect of the present disclosure includes a floor **1** and a wheel cover **3**.

[0067] Specifically, an opening portion **11** is provided on the floor **1**. Two wheel removal and mounting floor panels **5** are disposed in the opening portion **11**, a sub-opening portion is defined between the two wheel removal and mounting floor panels **5**, a wheel **2** is disposed at the sub-opening portion, a part of the wheel **2** passes through the sub-opening portion and protrudes from an upper surface of the floor **1**, and the two wheel removal and mounting floor panels **5** are respectively located on two sides of the wheel **2** in a front-rear direction of the railway vehicle **100**. Both the two wheel removal and mounting floor panels **5** are detachably connected to the floor **1**. The wheel cover **3** covers an upper side of the wheel **2** and the wheel cover **3** is connected to the two wheel removal and mounting floor panels **5**.

[0068] For example, referring to FIG. **1** to FIG. **3**, FIG. **5**, and FIG. **16**, the floor **1** extends in a horizontal direction, and the opening portion **11** may run through the floor **1** in an up-down direction. The two wheel removal and mounting floor panels **5** are disposed on two sides of the opening portion **11** in a length direction of the floor **1** at intervals. In this case, a width of the sub-opening portion in the length direction of the floor **1** is less than a width of the opening portion **11** in the length direction of the floor **1**. The wheel **2** is disposed at the sub-opening portion through penetration, an upper part of the wheel **2** is located above the floor **1**, and a lower part of the wheel **2** is located below the floor **1**. Therefore, by disposing the two wheel removal and mounting floor panels **5**, an area of the entire floor **1** is increased, and by fixing the wheel cover **3** to the two wheel removal and mounting floor panels **5**, a volume of the wheel cover **3** is reduced and a weight and an occupied space of the wheel cover are reduced, thereby implementing mounting of a small wheel cover and relatively increasing a space for a passenger. When the railway vehicle **100** is a straddle-type monorail vehicle, in a case of a same quantity of passengers, this solution can reduce a length of the entire vehicle, reduce a weight of the entire vehicle, and further improve the performance of the entire vehicle. In addition, distances between the wheel **2** and the two wheel removal and mounting floor panels **5** are relatively short, and a wheel space (that is, the sub-opening portion) reserved on a vehicle body of the railway vehicle such as the straddle-type monorail vehicle may be reduced, so that noise in the vehicle can be reduced, thereby improving the comfort of seat for passengers. The wheel **2** may be a walking wheel of the railway vehicle such as the straddle-type monorail vehicle.

[0069] When the wheel **2** needs to be removed, the wheel cover **3** may be first removed, and then the two wheel removal and mounting floor panels **5** are removed. After a sufficient space for removing the wheel **2** is reserved, the wheel **2** is removed finally. Conversely, when the wheel **2** is mounted, the wheel **2** may be first mounted, then the two wheel removal and mounting floor panels **5** are mounted, and finally the wheel cover **3** is mounted. Therefore, the wheel **2** can be removed and mounted in the vehicle. Compared with a conventional manner of changing a wheel outside the vehicle, the manner of removing and mounting the wheel in the vehicle is convenient in removal and mounting and is time-saving and labor-saving.

[0070] According to the railway vehicle **100** provided in the embodiments of the present disclosure, two detachable wheel removal and mounting floor panels **5** located on two sides of a wheel **2** in a radial direction are disposed, a part of the wheel **2** may pass through a sub-opening portion between the two wheel removal and mounting floor panels **5**, and a wheel cover **3** is connected to the two wheel removal and mounting floor panels **5**, so that an area of the entire floor **1** is increased and an occupied space of the wheel cover can be relatively reduced, to reduce a weight of the wheel cover **3**. When the railway vehicle **100** is a straddle-type monorail vehicle, the wheel **2** is removed and mounted in the vehicle, a weight of the railway vehicle such as the straddle-type monorail vehicle is reduced, the performance of the railway vehicle such as the straddle-type monorail vehicle is improved, and a wheel space reserved on a vehicle body is reduced, thereby reducing noise in the vehicle and improving the comfort of seat for passengers.

[0071] According to some embodiments of the present disclosure, as shown in FIG. **10** and FIG. **11**, a central axis of the wheel **2** is lower than an upper surface of the floor **1**. In this case, the central axis of the wheel **2** is located below a horizontal plane of the floor **1**. A size of a part of the wheel **2** located above the floor **1** is less than a size of a part of the wheel located below the floor **1**. Therefore, a part of the wheel **2** such as a walking wheel protruding from the floor **1** is relatively small, so that a relatively low floor is implemented and a proportion of a passenger space occupied by the protruding part of the walking wheel is reduced, to improve the comfort of seat. Referring to FIG. **8**, a distance between the two wheel removal and mounting floor panels **5** is less than a diameter of the wheel **2** in a length direction of the floor **1**. Such arrangement can further increase the area of the entire floor **1** and reduce the size of the part of the wheel **2** protruding from the floor **1**, so that the occupied space of the wheel cover **3** is further reduced and the weight of the wheel cover **3** is further reduced. Therefore, the wheel space reserved on the vehicle body is further reduced, the noise in the vehicle is further reduced, and the structure of the entire railway vehicle such as the straddle-type monorail vehicle can be more compact, thereby further improving the performance of the railway vehicle such as the straddle-type monorail vehicle.

[0072] Optionally, a maximum width of the opening portion **11** is greater than the diameter of wheels **2** in the length direction of the floor **1**. Therefore, after the two wheel removal and mounting floor panels **5** are removed, the wheel **2** can be further conveniently removed in the vehicle. Optionally, a longitudinal width of the opening portion **11** is greater than the diameter of the wheel **2** by at least 100 mm or more. Because the wheel **2** has a large weight, which is about 200 kg, the wheel **2** has a shaking amount when the wheel **2** is removed, and such arrangement better facilitates removal of the wheel **2**.

[0073] According to some embodiments of the present disclosure, as shown in FIG. **10** and FIG. **11**, a step structure **13** is disposed on an edge of the floor **1** located at the opening portion **11**, and one side of each wheel removal and mounting floor panel **5** away from the wheel **2** is disposed on the step structure **13**, and an upper surface of an overhauling floor panel **4** is flush with the upper surface of the floor **1**. For example, the step structure **13** may include a first upper surface **131** and a second upper surface **132** that are not located on a same plane. The first upper surface **131** is higher than the second upper surface **132** and the first upper surface **131** is located on one side of the second upper surface **132** away from the wheel **2**. During mounting, a part of the wheel removal and mounting floor panel **5** extends to an upper side of the second upper surface **132** and matches the second upper surface **132**, and an upper surface of the wheel removal and mounting floor panel **5** is flush with the first upper surface **131**. Therefore, it can be effectively ensured that the entire floor **1** is located on the same plane.

[0074] According to further embodiments of the present disclosure, referring FIG. **10** and FIG. **11**, a sealing member **124** is disposed between each wheel removal and mounting floor panel **5** and the floor **1**. For example, in examples of FIG. **10** and FIG. **11**, one side of each wheel removal and mounting floor panel **5** away from the wheel **2** extends to the upper side of the floor **1** such as the second upper surface **132**. The sealing member **124** is disposed between a lower surface of one side of each wheel removal and mounting floor panel **5** away from the wheel **2** and the second upper surface **132** of the floor **1**. With such arrangement, one side of each wheel removal and mounting floor panel **5** away from the wheel **2** may be propped to the floor **1**, noise transmission can be reduced, and mounting of the sealing member **124** is facilitated. Because the sealing member **124** may seal a gap between the wheel removal and mounting floor panel **5** and the floor **1**, noise from a lower vehicle body of the railway vehicle such as the straddle-type monorail vehicle can be effectively isolated.

[0075] Optionally, the sealing member **124** is a sealing rubber member. For example, the sealing member **124** may be a sealing rubber pad. Due to elasticity, a rubber structure can better seal the gap between the wheel removal and mounting floor panel **5** and the floor **1**, to achieve a good sound insulation effect. However, the present disclosure is not limited thereto.

[0076] According to some embodiments of the present disclosure, referring to FIG. **1** to FIG. **3** and FIG. **12** to FIG. **14**, a seat **6** is disposed on the wheel cover **3**. The seat **6** is configured for a passenger to sit on. Such arrangement effectively utilizes a space occupied by the wheel **2** protruding from the floor **1**. Specifically, for example, in examples of FIG. **1** to FIG. **3** and FIG. **12** to FIG. **14**, the seat **6** is fixedly connected to the top of the wheel cover **3**, the wheel cover **3** covers an upper side of the wheel **2**, and the wheel cover **3** and the seat **6** are detachably connected to the floor **1** as a whole. In this case, the wheel cover **3** and the seat **6** may be an integrated structure, and the seat **6** and the wheel cover **3** may be integrally formed. Certainly, the seat **6** and the wheel cover **3** may alternatively be separately processed and formed and then connected as a whole through welding or the like. Therefore, the wheel cover **3** is designed to be compatible with the seat **6**, and the wheel cover **3** and the seat **6** as a whole can simultaneously protect the wheel **2** and allow passengers to take. When requiring to be mounted or removed, the wheel cover **3** and the seat **6** only need to be mounted on the floor **1** or removed from the floor **1** as a whole. Compared with a conventional manner of requiring to first remove the seat and then remove the wheel cover, the manner is convenient in removal and is time-saving and labor-saving without a problem of destroying a mounting structure between the seat and the wheel cover and can implement mounting and removal of the wheel **2** in a compartment.

[0077] Further, as shown in FIG. **15**, an accommodating space **32** with the bottom being open and concave upward is formed on the wheel cover **3**, and the accommodating space **32** is configured to accommodate a part of the wheel **2**. Therefore, a part of the wheel **2** protruding from an upper surface of the floor **1** may be well covered by the wheel cover **3**.

[0078] Optionally, referring to FIG. **15**, a top wall of the accommodating space **32** is formed as an arc-shaped wall adapted to the shape of the wheel **2**. For example, the wheel cover **3** is formed as an upwardly protruding arch-shaped structure, which is preferably adapted to the shape of the wheel **2**. With this arrangement, it is ensured that the part of the wheel **2** can be well accommodated in the accommodating space **32**, and the space occupied by the wheel cover **3** in the compartment can be relatively reduced.

[0079] Certainly, the present disclosure is not limited thereto. The wheel cover **3** may further be formed in the form of seat **6** (not shown in the figure). For example, the wheel cover **3** and the seat **6** as a whole may also be formed as a seat in an upper part, and the bottom of the wheel cover **3** and the seat **6** as a whole is provided with an upwardly concave portion, where a part of the wheel **2** is located in the concave portion. Specifically, the wheel cover **3** may include a seat part and a backrest part. The seat part covers the upper side of the wheel **2**, the concave portion for accommodating the part of the wheel **2** is formed on the bottom of the seat part, a top surface of the seat part is a horizontal plane for the passenger to sit, and the backrest part extends upward from the top surface of the seat part for the passenger to recline. The wheel cover **3** may be a hollow structure with the bottom being open. In this case, the concave portion below the wheel cover **3** is configured to accommodate the part of the wheel **2** protruding from the upper surface of the floor **1**, and an upper part of the wheel cover **3** is for the passenger to directly sit. With this arrangement, the wheel cover **3** can be made relatively small and has a light weight.

[0080] Optionally, as shown in FIG. **16** to FIG. **20**, the wheel cover **3** and the seat **6** are collectively referred to as a wheel cover and seat assembly **7** as a whole. The wheel cover and seat assembly **7** is detachably connected to the floor **1** by a bolt structure **8**. Therefore, removal and mounting are convenient, and the connection through the bolt structure **8** is reliable, which is suitable for mass production and low in cost.

[0081] Further, referring to FIG. **16** to FIG. **20**, the bolt structure **8** is located in the wheel cover and seat assembly **7**. A wheel cover mounting opening **33** is formed in a lower portion of the wheel cover and seat assembly **7**. The wheel cover mounting opening **33** is adjacent to the bolt structure **8**, and a detachable sealing plate **34** is disposed at the wheel cover mounting opening **33**. Herein, it should be noted that, a direction "inside" may be understood as a direction toward an inner center of the wheel cover and seat assembly **7**, and a direction opposite to the "inside" is defined as "outside",

that is, a direction away from the inner center of the wheel cover and seat assembly **7**. With this arrangement, the bolt structure **8** may be well hidden inside the wheel cover and seat assembly **7**, to ensure the compactness of the entire railway vehicle **100**. During removal and mounting, the sealing plate **34** at the opening portion **11** may be opened, to tighten or loosen the bolt structure **8**.

[0082] Specifically, as shown in FIG. **21** to FIG. **25**, the sealing plate **34** may be fixedly connected to at least one fastener **341**. The fastener **341** includes a rod portion **3411** and an end portion **3412**, where one end of the rod portion **3411** is connected to the sealing plate **34** and the end portion **3412** is connected to the other end of the rod portion **3411**. A maximum size of the end portion **3412** in a cross section of the rod portion **3411** is greater than a maximum size of the rod portion **3411** in the cross section of the rod portion **3411**, and the end portion **3412** may be formed as a long strip shape. At least one mounting plate **331** is disposed at a position of the wheel cover and seat assembly **7** corresponding to the wheel cover mounting opening **33**, a locking structure **332** is disposed on the mounting plate **331**, and an elongated hole **3321** adapted to a shape of the end portion **3412** is formed in the locking structure **332**. During mounting, after passing through the elongated hole **3321** on the locking structure **332** on the mounting plate **331**, the end portion **3412** of the fastener **341** on the sealing plate **34** rotates by a specific angle. In this case, the end portion **3412** is staggered with the elongated hole **3321** on the locking structure **332**, to reliably mount the sealing plate **34** at the wheel cover mounting opening **33**. During removal, only the fastener **341** needs to be rotated, so that the end portion **3412** of the fastener is aligned with the elongated hole **3321** of the locking structure **332**. Subsequently, the sealing plate **34** is removed outward. In this case, the fastener **341** is withdrawn from the elongated hole **3321** of the locking structure **332** and the mounting plate **331**.

[0083] Certainly, the bolt structure **8** may also be located outside the wheel cover and seat assembly **7**. A groove with the top being open is formed in the floor **1**, the bolt structure **8** is located in the groove, and a detachable cover plate (not shown in the figure) is disposed on the top of the groove. Therefore, the bolt structure **8** is arranged outside the wheel cover and seat assembly **7**, to facilitate removal and mounting. Disposing of the cover plate allows the bolt structure **8** to be well hidden below the cover plate, which can similarly ensure the aesthetics of the entire railway vehicle **100**.

[0084] It can be understood that the sealing plate **34** and the cover plate may further be pivotally connected to a corresponding position by a hinge structure or the like, or may be clamped through a buckle structure or the like. However, the present disclosure is not limited thereto.

[0085] Specifically, referring to FIG. **16**, FIG. **17**, and FIG. **18**, the bolt structure **8** includes: a first connecting member **81**, a second connecting member **82**, and at least one bolt **83**. The first connecting member **81** is disposed on the floor **1**, a C-shaped groove **811** with the top being open is formed in the first connecting member **81**, at least one threaded connector is disposed in the C-shaped groove **811**, the second connecting member **82** is disposed on the wheel cover and seat assembly **7**, a connecting plate **821** is disposed at a free end of the second connecting member **82**, the connecting plate **821** is supported on a top surface of the first connecting member **81**, and the bolt **83** runs through the connecting plate **821** and is in threaded connection with the threaded connector. When requiring to be mounted or removed, the entire wheel cover and seat assembly **7** is removed. Specifically, the wheel cover and seat assembly **7** is fixed to the C-shaped groove **811** of the first connecting member **81** on the floor **1** by using the bolt **83**. When the wheel cover and seat assembly **7** needs to be removed, the sealing plate **34** or the cover plate for decoration is first removed, and then the bolt **83** such as a fastening bolt is loosened, so that the entire wheel cover and seat assembly **7** is removed. A mounting process is opposite to the removal process. Therefore, by using the C-shaped groove **811**, the accuracy of positioning the bolt **83** and the threaded connector can be improved, and the assembly efficiency is improved. When a plurality of threaded connectors are disposed in the C-shaped groove **811**, the threaded connectors may be nuts fixed to the C-shaped groove **811** or movable in the C-shaped groove **811**. In this case, machining precision of a plurality of connecting plates **821** can be reduced, and the costs can be saved.

[0086] For example, when the threaded connector in the C-shaped groove **811**, for example, the nut in the C-shaped groove **811**, is movable, during mounting and removal of the wheel cover and seat assembly **7**, the wheel cover and seat assembly **7** may move leftward and rightward along the C-shaped groove **811**. When an assembly error exists, the assembly error can be reduced by moving the wheel cover and seat assembly **7** leftward and rightward, so that the wheel cover and seat assembly **7** is easy to remove. In addition, as shown in FIG. **27**, when a positioning destination of the wheel cover and seat assembly **7** is a spacer in the railway vehicle such as the straddle-type monorail vehicle, after the wheel cover and seat assembly **7** is mounted in the C-shaped groove **811**, the wheel cover and seat assembly **7** may be pushed toward the spacer, so that the wheel cover and seat assembly **7** is seamlessly propped to the spacer. When the wheel cover and seat assembly **7** needs to be removed, the wheel cover and seat assembly **7** is pushed away from the spacer, so that the wheel cover and seat assembly **7** is removed.

[0087] As shown in FIG. **21** and FIG. **26**, the wheel cover **3** includes a dustproof cover **31** and a wheel cover outer cover **35**. The dustproof cover **31** covers the wheel **2**, and the wheel cover outer cover **35** covers the dustproof cover **31**. Specifically, for example, the wheel cover outer cover **35** may be fixedly connected to the dustproof cover **31** by a wheel cover frame **36**. A plurality of wheel cover outer cover connecting plates **362** may be disposed on the top of the wheel cover frame **36**, the wheel cover frame **36** is fixedly connected to the wheel cover outer cover **35** by using a bolt by the plurality of wheel cover outer cover connecting plates **362**, a plurality of dustproof cover connecting plates **361** may be disposed on the bottom of the wheel cover frame **36**, and the wheel cover frame **36** is fixedly connected to the dustproof cover **31** by using a bolt by the plurality of dustproof cover connecting plates **361**. In this way, the dustproof cover **31** and the wheel cover outer cover **35** may be connected as a whole. In this case, the dustproof cover **31** and the wheel cover outer cover **35** are an integrated structure. During removal, the dustproof cover **31** and the wheel cover outer cover **35** are removed as a whole.

[0088] According to some specific embodiments of the present disclosure, referring to FIG. **3**, FIG. **4**, and FIG. **6** to FIG. **11**, at least two fixed supports **12** are disposed on a side wall **113** of the opening portion **11**. The two wheel removal

and mounting floor panels **5** are respectively supported on upper surfaces of the at least two fixed supports **12**, and the two wheel removal and mounting floor panels **5** are respectively detachably connected to the at least two fixed supports **12**. With this arrangement, the fixed supports **12** can reliably support the wheel removal and mounting floor panels **5**, so that the wheel cover **3** can be more reliably mounted on the wheel removal and mounting floor panels **5**.

[0089] Specifically, as shown in FIG. **3**, FIG. **4**, and FIG. **6** to FIG. **11**, each fixed support **12** includes: a fixed portion **121** and a support portion **122**. The fixed portion **121** is connected to the side wall **113** of the opening portion **11**, one end of the support portion **122** is fixedly connected to the top of the fixed portion **121**, and the other end of the support portion **122** horizontally extends toward the wheel **2**. The wheel removal and mounting floor panel **5** is supported on an upper surface of the support portion **122**, and the wheel removal and mounting floor panel **5** is detachably connected to the support portion **122**. For example, in examples of FIG. **4** and FIG. **7**, both the fixed portion **121** and the support portion **122** may be plate-shaped structures, the fixed portion **121** and the support portion **122** are generally L-shaped as a whole, and the fixed portion **121** and the support portion **122** may be processed and formed as a whole. For example, the fixed portion **121** and the support portion **122** may be formed by bending a flat plate, and the fixed portion **121** may be detachably connected to the side wall **113** of the opening portion **11** by a bolt or the like, so that the entire fixed support **12** is fixed to the floor **1**, achieving convenient mounting and a reliable connection. The upper surface of the support portion **122** can support the wheel removal and mounting floor panel **5**, and the horizontal support portion **122** facilitates connection between the support portion and the wheel removal and mounting floor panel **5**, so that the assembly efficiency can be improved.

[0090] For example, in FIG. **1** to FIG. **5**, each wheel removal and mounting floor panel **5** is supported and fixed by two fixed supports **12**, and the two fixed supports **12** are respectively located on two ends of the wheel removal and mounting floor panel **5** in a length direction. Herein, the two fixed supports **12** are for the purpose of exemplary description. However, after reading the technical solution of this application, a person of ordinary skill can obviously understand that the solution is applied to the technical solution of three or more fixed supports **12**, which also falls within the protection scope of the present disclosure.

[0091] Optionally, referring to FIG. **4**, FIG. **8**, and FIG. **9**, the upper surface of the support portion **122** is lower than the upper surface of the floor **1** and a distance between the upper surface of the support portion **122** and the upper surface of the floor **1** is equal to a thickness of the wheel removal and mounting floor panel **5**. In this case, the upper surface of the support portion **122** is lower than the upper surface of the floor **1**, and after the wheel removal and mounting floor panel **5** is mounted on the fixed support **12**, an upper surface of the wheel removal and mounting floor panel **5** may be flush with the upper surface of the floor **1**.

[0092] Optionally, as shown in FIG. **4**, a width of the support portion **122** of the fixed support **12** is greater than half of a width of the wheel removal and mounting floor panel **5**. In this way, the floor panel can be supported more reliably. Similarly, to improve the stability of the support for the wheel removal and mounting floor panel **5**, one end of the wheel removal and mounting floor panel **5** may further be configured in a curved edge or a bevel, as shown in FIG. **4**.

[0093] Further, each fixed support **12** further includes: at least one reinforcing rib **123**. The reinforcing rib **123** is connected between a lower surface of the support portion **122** and a surface on one side of the fixed portion **121** adjacent to wheels **2**, as shown in FIG. **4**, FIG. **7**, and FIG. **9**. Therefore, by disposing the reinforcing rib **123**, a structural strength of the fixed support **12** can be improved. Optionally, the reinforcing rib **123** may be a plate-shaped structure. Certainly, the reinforcing rib **123** may alternatively be a rod-shaped structure (not shown in the figure). However, the present disclosure is not limited thereto.

[0094] According to some embodiments of the present disclosure, referring to FIG. **8** and FIG. **9**, an avoiding opening **1231** is formed in the reinforcing rib **123**, and the avoiding opening **1231** is located at a joint between the support portion **122** and the fixed portion **121**. For example, in an example of FIG. **9**, the avoiding opening **1231** may be a triangular notch. In this case, a gap exists between the reinforcing rib **123** and the corresponding joint between the support portion **122** and the fixed portion **121**. Such arrangement can avoid stress concentration on the joint between the support portion **122** and the fixed portion **121** and improve the support reliability of the fixed support **12**.

[0095] Optionally, the wheel removal and mounting floor panel **5** is connected to the support portion **122** by a bolt. Therefore, removal and mounting are convenient, the bolt structure is simple, the connection is reliable, and the costs are low.

[0096] Optionally, the fixed support **12** is an aluminum member. However, the present disclosure is not limited thereto.

[0097] Optionally, referring to FIG. **11**, the thickness of each wheel removal and mounting floor panel **5** is t, and t meets 30 mm≤t≤50 mm. Therefore, the thickness t is set to meet 30 mm≤t≤50 mm, it is ensured that a strength requirement of the railway vehicle such as the straddle-type monorail vehicle on the floor **1** is met and the costs can be saved. For example, when the thickness t is less than 30 mm, the thickness of the wheel removal and mounting floor panel **5** is relatively small, which may not meet the strength requirement of the railway vehicle such as the straddle-type monorail vehicle on the floor **1**, that is, deformation or cracking may occur when a plurality of passengers stands on the floor, easily resulting in a safety hazard. When the thickness t is greater than 50 mm, the thickness of the wheel removal and mounting floor panel **5** is relatively large. In this case, the entire wheel removal and mounting floor panel **5** is heavy, and the costs are high. Further, optionally, the thickness t meets: t=30 mm.

[0098] Optionally, both the two wheel removal and mounting floor panels **5** are aluminum or steel. An aluminum material and a steel material can meet the strength requirement well, and the two materials are widely used with relatively low costs. In addition, the weight of the aluminum material is relatively light, which can meet the lightweight design. However, the present disclosure is not limited thereto.

[0099] It can be understood that a shape of each wheel removal and mounting floor panel **5** may include a straight edge shown in FIG. **4** or may include an arc-shaped or ellipse arc-shaped edge or the like. The specific shape may

be specifically designed according to a condition around the opening portion **11** of the railway vehicle such as the straddle-type monorail vehicle, to better meet an actual application.

[0100] According to some embodiments of the present disclosure, as shown in FIG. **1** to FIG. **3**, an overhauling floor panel **4** is further disposed in the opening portion **11**, and the overhauling floor panel **4** may be detachably connected to a wheel access panel **111**. Specifically, the opening portion **11** may include the wheel access panel **111** and a wheel mounting opening **112** in communication with each other. The wheel access panel **111** and the wheel mounting opening **112** may be understood as different regions of the opening portion **11**. The two wheel removal and mounting floor panels **5** are mounted at the wheel mounting opening **112**, the wheel mounting opening **112** (that is, the sub-opening portion) is defined between the two wheel removal and mounting floor panels **5**, a part of the wheel **2** passes through the wheel mounting opening **112** and protrudes from the upper surface of the floor **1**, and the overhauling floor panel **4** is detachably connected to the wheel access panel **111**. Therefore, after the overhauling floor panel **4** is removed, the wheel **2** may be overhauled by using the wheel access panel **111**. Specifically, when the wheel **2** needs to be overhauled, for example, daily tire pressure detection, tire inflation and deflation, and pattern depth measurement are performed on the wheel **2** such as a walking wheel, the overhauling floor panel **4** may be removed from the floor **1**, and the wheel access panel **111** is exposed. In this case, the wheel **2** in the wheel mounting opening **112** may be viewed and operated through the wheel access panel **111**, to overhaul and maintain the wheel **2**. Compared with a conventional manner in which access panels are respectively disposed on the wheel cover outer cover and the dustproof cover, in the manner, for example, when the wheel cover **3** includes the wheel cover outer cover **35** and the dustproof cover **31**, no access panel needs to be disposed on the wheel cover outer cover **35** and the dustproof cover **31**, so that the dustproof and sound insulation effects of the dustproof cover **31** can be ensured. In addition, the floor panel **4** can be made large, to increase an overhauling space (that is, the wheel access panel **111**) for the wheel **2**, thereby facilitating the daily overhauling and maintenance on the wheel **2**.

[0101] Referring to FIG. **1** to FIG. **3**, the wheel access panel **111** is located on one side of the wheel **2** in a left-right direction of the railway vehicle **100**. This arrangement is convenient for maintenance personnel to perform operations such as tire pressure detection, tire inflation and deflation, and pattern depth measurement on the wheel **2** such as the walking wheel in the wheel access panel **111**.

[0102] Optionally, a longitudinal maximum width of the wheel access panel **111** is greater than the diameter of the wheel **2** For example, a width of the wheel access panel **111** is greater than the diameter of the wheel **2** in the length direction of the floor **1**, and a size of the wheel access panel **111** is relatively large, so that daily overhauling and maintenance on the wheel **2** can be more convenient.

[0103] According to further embodiments of the present disclosure, referring to FIG. **1** to FIG. **4**, the overhauling floor panel **4** may be mounted at the opening portion **11** by using at least one fixed support **12**. Further, as shown in FIG. **1** to FIG. **4**, some fixed supports **12** can support both the overhauling floor panel **4** and the wheel removal and mounting floor panel **5**. In this way, a quantity of fixed supports **12** can be reduced, and the overhauling floor panel **4** and the wheel removal and mounting floor panel **5** can be more tightly and neatly connected.

[0104] Still further, to reduce noise transmission, a sealing member **124** may also be disposed between the overhauling floor panel **4** and the floor **1**, and the sealing member **124** may be disposed between a lower surface of the overhauling floor panel **4** and the upper surface of the floor **1**, as shown in FIG. **10** and FIG. **11**.

[0105] A railway vehicle such as a straddle-type monorail vehicle according to embodiments of a second aspect of the present disclosure includes the railway vehicle **100** according to the foregoing embodiments of the first aspect of the present disclosure.

[0106] According to the railway vehicle such as the straddle-type monorail vehicle provided in the embodiments of the present disclosure, by using the railway vehicle **100**, a small wheel cover may be mounted, and a wheel **2** may be removed in the vehicle, so that the entire performance of the railway vehicle such as the straddle-type monorail vehicle is improved.

[0107] Other configurations and operations of the railway vehicle such as the straddle-type monorail vehicle according to the embodiments of the present disclosure are known to those of ordinary skill in the art, and are not described in detail herein.

[0108] In the description of the present disclosure, it should be understood that, orientations or position relationships indicated by terms such as "center", "longitudinal", "transverse", "length", "width", "thickness", "up", "down", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", and "circumferential" are orientations or position relationships shown based on the accompanying drawings, and are used only for ease of describing the present disclosure and simplifying the description, rather than indicating or implying that the apparatus or element should have a particular orientation or be constructed and operated in a particular orientation, and therefore, should not be construed as a limitation on the present disclosure.

[0109] In addition, terms "first" and "second" are used merely for the purpose of description, and shall not be construed as indicating or implying relative importance or implying a quantity of indicated technical features. Therefore, features defining "first" and "second" may explicitly or implicitly include one or more such features. In the description of the present disclosure, the meaning of "plurality of" is two or more, unless specifically defined otherwise.

[0110] In the present disclosure, it should be noted that unless otherwise explicitly specified and limited, the terms "mount", "connect", "connection", and "fix" should be understood in a broad sense. For example, a connection may be a fixed connection, a detachable connection, or an integral connection; or the connection may be a mechanical connection or an electrical connection; a direct connection, an indirect connection through an intermediate, or internal communication between two elements or an interaction relationship between two elements. The specific meanings of the above terms in the present disclosure may be understood according to specific circumstances for those ordinary skill in the art.

[0111] In the present disclosure, unless otherwise explicitly specified or defined, the first feature being located

"above" or "below" the second feature may be the first feature being in direct contact with the second feature, or the first feature being in indirect contact with the second feature through an intermediate medium. In addition, that the first feature is "above", "over", or "on" the second feature may indicate that the first feature is directly above or obliquely above the second feature, or may merely indicate that the horizontal position of the first feature is higher than that of the second feature. That the first feature is "below", "under", and "beneath" the second feature may be that the first feature is directly below or obliquely below the second feature, or may merely indicate that the horizontal position of the first feature is lower than that of the second feature.

[0112] In the description of this specification, the description of the reference terms "an embodiment", "some embodiments", "an example", "a specific example", "some examples," and the like means that specific features, structures, materials or characteristics described in combination with the embodiment(s) or example(s) are included in at least one embodiment or example of the present disclosure. In this specification, exemplary descriptions of the foregoing terms do not necessarily refer to a same embodiment or example. Besides, the specific features, the structures, the materials or the characteristics that are described may be combined in proper manners in any one or more embodiments or examples. In addition, a person skilled in the art may integrate or combine different embodiments or examples described in the specification and features of the different embodiments or examples as long as they are not contradictory to each other.

[0113] Although the embodiments of the present disclosure have been shown and described above, it can be understood that, the foregoing embodiments are exemplary and should not be understood as limitation to the present disclosure. A person of ordinary skill in the art can make changes, modifications, replacements, or variations to the foregoing embodiments within the scope of the present disclosure.

What is claimed is:

1. A railway vehicle, comprising:

a floor, wherein an opening portion is provided on the floor;

two wheel removal and mounting floor panels, disposed in the opening portion, wherein a sub-opening portion is defined between the two wheel removal and mounting floor panels; a wheel, disposed at the sub-opening portion, wherein a part of the wheel passes through the sub-opening portion and protrudes from an upper surface of the floor, the two wheel removal and mounting floor panels are respectively located on two sides of the wheel in a front-rear direction of the railway vehicle, and both the two wheel removal and mounting floor panels are detachably connected to the floor; and

a wheel cover, covering an upper side of the wheel, and connected to the two wheel removal and mounting floor panels.

2. The railway vehicle according to claim **1**, wherein a central axis of the wheel is lower than the floor, and a distance between the two wheel removal and mounting floor panels is less than a diameter of the wheel in a length direction of the floor.

3. The railway vehicle according to claim **1**, wherein a maximum width of the opening portion is greater than the diameter of the wheel in the length direction of the floor.

4. The railway vehicle according to claim **1**, wherein a step structure is disposed on an edge of the floor located at the opening portion, and one side of each wheel removal and mounting floor panel away from the wheel is disposed on the step structure and is flush with the upper surface of the floor.

5. The railway vehicle according to claim **1**, wherein a sealing member is disposed between each wheel removal and mounting floor panel and the floor.

6. The railway vehicle according to claim **1**, wherein at least one seat is disposed on the wheel cover.

7. The railway vehicle according to claim **1**, wherein at least two fixed supports are disposed on a side wall of the opening portion, each wheel removal and mounting floor panel is supported on an upper surface of at least one fixed support, and each wheel removal and mounting floor panel is detachably connected to the at least one fixed support.

8. The railway vehicle according to claim **7**, wherein each fixed support comprises:

a fixed portion, connected to the side wall of the opening portion;

a support portion, wherein one end of the support portion is fixedly connected to the top of the fixed portion, the other end of the support portion horizontally extends toward the wheel, the wheel removal and mounting floor panel is supported on an upper surface of the support portion, and the wheel removal and mounting floor panel is detachably connected to the support portion.

9. The railway vehicle according to claim **8**, wherein the upper surface of the support portion is lower than the upper surface of the floor and a distance between the upper surface of the support portion and the upper surface of the floor is equal to a thickness of the wheel removal and mounting floor panel.

10. The railway vehicle according to claim **8**, wherein each fixed support further comprises:

at least one reinforcing rib, being connected between a lower surface of the support portion and a surface on one side of the fixed portion adjacent to the wheel.

11. The railway vehicle according to claim **10**, wherein an avoiding opening is formed in the reinforcing rib and the avoiding opening is located at a joint between the support portion and the fixed portion.

12. The railway vehicle according to claim **1**, wherein a thickness of each wheel removal and mounting floor panel is t, and t meets 30 mm≤t≤50 mm.

13. The railway vehicle according to claim **2**, wherein a maximum width of the opening portion is greater than the diameter of the wheel in the length direction of the floor.

14. The railway vehicle according to claim **13**, wherein a step structure is disposed on an edge of the floor located at the opening portion, and one side of each wheel removal and mounting floor panel away from the wheel is disposed on the step structure and is flush with the upper surface of the floor.

15. The railway vehicle according to claim **14**, wherein a sealing member is disposed between each wheel removal and mounting floor panel and the floor.

16. The railway vehicle according to claim **15**, wherein at least one seat is disposed on the wheel cover.

17. The railway vehicle according to claim **16**, wherein at least two fixed supports are disposed on a side wall of the opening portion, each wheel removal and mounting floor panel is supported on an upper surface of at least one fixed

support, and each wheel removal and mounting floor panel is detachably connected to the at least one fixed support.

18. The railway vehicle according to claim **17**, wherein each fixed support comprises:

a fixed portion, connected to the side wall of the opening portion;

a support portion, wherein one end of the support portion is fixedly connected to the top of the fixed portion, the other end of the support portion horizontally extends toward the wheel, the wheel removal and mounting floor panel is supported on an upper surface of the support portion, and the wheel removal and mounting floor panel is detachably connected to the support portion.

19. The railway vehicle according to claim **18**, wherein the upper surface of the support portion is lower than the upper surface of the floor and a distance between the upper surface of the support portion and the upper surface of the floor is equal to a thickness of the wheel removal and mounting floor panel.

20. The railway vehicle according to claim **19**, wherein each fixed support further comprises:

at least one reinforcing rib, being connected between a lower surface of the support portion and a surface on one side of the fixed portion adjacent to the wheel.

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