

DESCRIPTION

Title of Invention: RAILCAR BOGIE FRAME AND BOGIE INCLUDING SAME

Technical Field

[0001] The present invention relates to a railcar bogie frame and a bogie including the railcar bogie frame.

Background Art

[0002] In many cases, a pair of air springs as secondary suspensions are mounted on a bogie frame of a railcar so as to be spaced apart from each other in a car width direction.

Citation List

Patent Literature

[0003] PTL 1: Japanese Laid-Open Patent Application Publication No. 2016-88403

Summary of Invention

Technical Problem

[0004] An interval between the pair of air springs differs depending on the specification of the type of each car. Therefore, a support structural portion of the air spring of the bogie frame needs to be changed depending on the type of each car. However, since the bogie frame is an important strength member configured to receive a carbody load through the air springs, the layout of the support structural portion of the air spring of the bogie frame may be limited by reinforcement. Therefore, each time the type of the car changes, the entire bogie frame needs to be redesigned from the viewpoint of the strength, the layout, and the like, and the assembly procedure also needs to be reconsidered.

[0005] An object of the present invention is to: standardize most parts of a bogie frame among the types of cars among which the position of an air spring is different; and improve a design efficiency and assembly work efficiency of a bogie.

Solution to Problem

[0006] A railcar bogie frame according to one aspect of the present invention includes: a pair of cross beam main bodies extending in a car width direction; longitudinal members located at both respective car width direction side portions of the pair of cross beam main bodies, the longitudinal members being perpendicular to the cross beam main bodies and including respective insertion spaces, the insertion spaces being located between the pair of cross beam main bodies and extending in the car width direction; lower plates located at both respective car width direction side portions of the pair of cross beam main bodies and extending between the pair of cross beam main bodies; and lateral members inserted through the respective insertion spaces and extending in the car width direction, the lateral members being joined to respective

upper surfaces of the lower plates and also joined to respective edge portions of the longitudinal members which portions form the respective insertion spaces. Each of the lateral members includes: a columnar member including an inserting space into which a tubular portion is inserted, the tubular portion projecting downward from a bottom wall portion of an air spring; and a pair of reinforcing members adjacently arranged at both respective sides of the columnar member in the car width direction.

[0007] According to the above configuration, the lateral member including the columnar member into which the tubular portion of the air spring is inserted is inserted through the insertion space formed at the longitudinal member. Therefore, the position of the air spring in the car width direction can be easily changed only by changing the length of the lateral member such that the position of the columnar member of the lateral member in the car width direction is changed. On this account, most parts of the bogie frame can be standardized among the types of the cars among which the position of the air spring is different. Thus, the strength design of the bogie frame is facilitated, and the design efficiency improves.

Advantageous Effects of Invention

[0008] According to the present invention, most parts of the bogie frame can be standardized among the types of the cars among which the position of the air spring is different, and the design efficiency and assembly work efficiency of the bogie can be improved.

Brief Description of Drawings

[0009] Fig. 1 is a side view of a railcar bogie according to Embodiment 1.

Fig. 2 is a plan view of a cross beam of the bogie of Fig. 1.

Fig. 3 is a perspective view of the cross beam of Fig. 2 when viewed from above.

Fig. 4 is a perspective view of major components of the cross beam of Fig. 2 when viewed from an outside in a car width direction.

Fig. 5 is a perspective view of the major components of the cross beam of Fig. 2 when viewed from an inside in the car width direction.

Fig. 6 is a cross sectional view of the cross beam of Fig. 2, a pressing member, and a plate spring when viewed from the car width direction.

Fig. 7 is a cross sectional view of the cross beam of Fig. 2, the pressing member, and the plate spring when viewed from a car longitudinal direction.

Fig. 8 is a side view of the railcar bogie according to Embodiment 2.

Fig. 9 is a plan view of major components of a bogie frame of the bogie of Fig. 8.

Description of Embodiments

[0010] Hereinafter, embodiments will be described with reference to the drawings. In the

following description, a direction in which a railcar travels and a carbody extends is defined as a car longitudinal direction, and a lateral direction perpendicular to the car longitudinal direction is defined as a car width direction. The car longitudinal direction is also referred to as a front-rear direction, and the car width direction is also referred to as a left-right direction.

[0011] **Embodiment 1**

Fig. 1 is a side view of a railcar bogie 1 according to Embodiment 1. As shown in Fig. 1, the bogie 1 supports a carbody 3 from below through air springs 2 as secondary suspensions. The bogie 1 includes a bogie frame 4 on which the air springs 2 are mounted. The bogie frame 4 includes a cross beam 5 extending in the car width direction but does not include side sills extending from both respective car width direction end portions of the cross beam 5 in the car longitudinal direction. A pair of axles 6 extending in the car width direction are arranged at both respective sides of the cross beam 5 in the car longitudinal direction. Wheels 7 are provided at both respective car width direction portions of each axle 6. Bearings 8 are provided at both respective car width direction end portions of the axles 6. The bearings 8 are provided outside the corresponding wheels 7 in the car width direction and support the axles 6. The bearings 8 are accommodated in respective axle boxes 9.

[0012] The car width direction end portions of the cross beam 5 are coupled to the axle boxes 9 by, for example, axle beam type axle box suspensions 10. Each of the axle box suspensions 10 includes an axle beam 11 extending from the axle box 9 in the car longitudinal direction toward the cross beam 5. The bogie frame 4 includes receiving seats 12 each projecting from the cross beam 5 toward the axle beams 11, and a tip end portion of each axle beam 11 is elastically coupled to the receiving seat 12 through a rubber bushing (not shown). A pair of axle boxes 9 provided away from each other in the car longitudinal direction support both respective longitudinal direction end portions 13b of each of plate springs 13 extending in the car longitudinal direction. Longitudinal direction middle portions 13a of the plate springs 13 support the respective car width direction end portions of the cross beam 5 from below. With this, the cross beam 5 is supported by the axle boxes 9 through the plate springs 13. To be specific, the plate spring 13 has both the function of a primary suspension and the function of a conventional side sill.

[0013] The middle portion 13a of the plate spring 13 is arranged lower than the end portions 13b of the plate spring 13, and the plate spring 13 has a bow shape that is convex downward in a side view. The plate spring 13 is made of fiber-reinforced resin. A pressing member 14 having a circular-arc lower surface that is convex downward is provided at a lower portion of each car width direction end portion of the cross beam 5. The pressing member 14 is placed on

the middle portion 13a of the plate spring 13 from above and separably contacts the middle portion 13a of the plate spring 13. To be specific, the pressing member 14 is brought into contact with an upper surface of the plate spring 13 by gravitational downward force from the cross beam 5 without fixing the plate spring 13 to the pressing member 14 in an upper-lower direction. To be specific, the pressing member 14 is not fixed to the plate spring 13 by a fixture, but the contact of the pressing member 14 with the upper surface of the plate spring 13 is kept by contact pressure generated by the gravitational downward force from the cross beam 5 and reaction force of the plate spring 13 with respect to the gravitational downward force. With this, the plate spring 13 can swing while changing a region pressed against the lower surface of the pressing member 14. It should be noted that the pressing member 14 may be directly placed on an upper surface of the middle portion 13a of the plate spring 13 or may be indirectly placed on the upper surface of the middle portion 13a of the plate spring 13 through an interposed member (for example, a buffer sheet).

[0014] A supporting member 15 is attached to an upper end portion of each axle box 9, and the end portion 13b of the plate spring 13 is supported by the axle box 9 from below through the supporting member 15. An upper surface of the supporting member 15 is inclined toward a bogie middle side in a side view. The end portion 13b of the plate spring 13 is placed on the supporting member 15 from above without being fixed to the supporting member 15 in the upper-lower direction. The supporting member 15 includes a base member 16 (for example, a vibrationproof rubber) and a receiving member 17. The base member 16 is provided on the axle box 9. The receiving member 17 is provided and positioned on the base member 16. The receiving member 17 includes a recess in which the end portion 13b of the plate spring 13 is accommodated, and the recess is open toward an upper side and the bogie middle side. A sheet (for example, a rubber sheet) having lower hardness than the plate spring 13 and the receiving member 17 is sandwiched between a bottom surface of the recess of the receiving member 17 and the end portion 13b of the plate spring 13.

[0015] Fig. 2 is a plan view of the cross beam 5 of the bogie 1 of Fig. 1. Fig. 3 is a perspective view of the cross beam 5 of Fig. 2 when viewed from above. Fig. 4 is a perspective view of major components of the cross beam 5 of Fig. 2 when viewed from an outside in the car width direction. Fig. 5 is a perspective view of the major components of the cross beam 5 of Fig. 2 when viewed from an inside in the car width direction. As shown in Figs. 2 to 5, the cross beam 5 includes cross beam main bodies 21, coupling members 22, longitudinal members 23, lower plates 24, lateral members 25, and upper plates 26, and these are joined to each other by, for example, welding.

[0016] The cross beam main bodies 21 are a pair of tubular members (for example, square pipes) arranged away from each other in the car longitudinal direction. Both longitudinal direction ends of the cross beam main bodies 21 are closed such that auxiliary air chambers for the air springs 2 are formed inside the cross beam main bodies 21. In a state where each of the coupling members 22 are arranged between the pair of cross beam main bodies 21, the coupling member 22 is perpendicular to the cross beam main bodies 21 and is joined to the pair of cross beam main bodies 21.

[0017] The longitudinal members 23 are located at both respective car width direction side portions of the cross beam main bodies 21. Each of the longitudinal members 23 is arranged between the pair of cross beam main bodies 21 and is perpendicular to the cross beam main bodies 21. An insertion space S1 extending in the car width direction is formed at each longitudinal member 23. In the present embodiment, the longitudinal member 23 is constituted by a first longitudinal member 31 and a second longitudinal member 32. The first longitudinal member 31 is joined to one of the pair of cross beam main bodies 21, and the second longitudinal member 32 is joined to the other of the pair of cross beam main bodies 21. A gap is formed between the first longitudinal member 31 and the second longitudinal member 32, and this gap is the insertion space S1. The longitudinal member 23 has, for example, an inverted U-shaped cross section when viewed from the car longitudinal direction.

[0018] The lower plates 24 are located under both respective car width direction side portions of the pair of cross beam main bodies 21. Each of the lower plates 24 is joined to lower surfaces of the pair of cross beam main bodies 21 so as to extend between the pair of cross beam main bodies 21. A groove portion 24a extending in the car longitudinal direction is formed on a lower surface of each lower plate 24 such that the pressing member 14 is fitted in the groove portion 24a. A lower end of the first longitudinal member 31 and a lower end of the second longitudinal member 32 are joined to an upper surface of the lower plate 24.

[0019] Each of the lateral members 25 is inserted through the insertion space S1 and extends in the car width direction. A lower end of the lateral member 25 is joined to the upper surface of the lower plate 24. In other words, in a state where the lateral member 25 is not inserted through the insertion space S1, the insertion space S1 is closed by the lower plate 24 from below but is open upward and in the car width direction. Edge portions of the first and second longitudinal members 31 and 32 which portions form the insertion space S1 are joined to the lateral member 25.

[0020] The lateral member 25 is constituted by a columnar member 33, a first reinforcing member 34, and a second reinforcing member 35. The columnar member 33 is a prismatic

body extending in a vertical direction. The columnar member 33 includes an inserting space S2 extending in the vertical direction, and a tubular portion 2a projecting downward from a bottom wall portion of the air spring 2 is inserted into the inserting space S2. The inserting space S2 communicates with internal spaces (auxiliary air chambers) of the cross beam main bodies 21 through a passage forming body (not shown; for example, a pipe). The columnar member 33 projects upward beyond the longitudinal member 23, the first reinforcing member 34, the second reinforcing member 35, and the cross beam main bodies 21. The columnar member 33 is located outside the longitudinal member 23 in the car width direction. The columnar member 33 is not limited to the prismatic body and may be a columnar body. The shape of the columnar member 33 is not limited to these.

[0021] The first reinforcing member 34 is adjacently located at an inside of the columnar member 33 in the car width direction and is joined to the columnar member 33. The first reinforcing member 34 extends in the car width direction. The first reinforcing member 34 is inserted through the insertion space S1 and is joined to the edge portions of the first and second longitudinal members 31 and 32 which portions form the insertion space S1. The second reinforcing member 35 is adjacently located at an outside of the columnar member 33 in the car width direction and is joined to the columnar member 33. The first reinforcing member 34 and the second reinforcing member 35 are different in length in the car width direction from each other. Each of an upper surface of the first reinforcing member 34 and an upper surface of the second reinforcing member 35 is the same in height as an upper surface of the longitudinal member 23. However, the upper surface of the first reinforcing member 34 does not have to be the same in height as the upper surface of the longitudinal member 23 as long as the first reinforcing member 34 is accommodated in the insertion space S1.

[0022] A first car longitudinal direction side surface of the first reinforcing member 34, a first car longitudinal direction side surface of the second reinforcing member 35, and a first car longitudinal direction side surface of the columnar member 33 are parallel to the car width direction and are formed on the same plane. A second car longitudinal direction side surface of the first reinforcing member 34, a second car longitudinal direction side surface of the second reinforcing member 35, a second car longitudinal direction side surface of the columnar member 33 are parallel to the car width direction and are formed on the same plane. Each of the first reinforcing member 34 and the second reinforcing member 35 has an inverted U-shaped cross section when viewed from the car width direction.

[0023] Each of the upper plates 26 is arranged above the longitudinal member 23 and the lateral member 25 and joined to upper surfaces of the pair of cross beam main bodies 21 so as to

extend between the pair of cross beam main bodies 21. The upper plate 26 includes a through hole 26a through which the columnar member 33 penetrates upward. The air spring 2 is placed on the upper plate 26. The upper plate 26 extends inward in the car width direction to a position above the coupling member 22. The upper plate 26 is joined to an upper end of the coupling member 22. A lightening hole 26b is formed at a region of the upper plate 26 in a plan view, the region being located between the coupling member 22 and the lateral member 25.

[0024] Fig. 6 is a cross sectional view of the cross beam 5 of Fig. 2, the pressing member 14, and the plate spring 13 when viewed from the car width direction. Fig. 7 is a cross sectional view of the cross beam 5 of Fig. 2, the pressing member 14, and the plate spring 13 when viewed from the car longitudinal direction. For simplicity, Fig. 7 does not show members which are not related to the following description. As shown in Figs. 6 and 7, the pressing member 14 is attached to the lower surface of the lower plate 24 of the cross beam 5. An upper portion of the pressing member 14 is positioned in the car width direction by being fitted in the groove portion 24a of the lower plate 24. The lower surface of the lower plate 24 and an upper surface of the pressing member 14 are positioned in a horizontal direction (especially in the car longitudinal direction) by a recess-projection fitting structure 27. The recess-projection fitting structure 27 is constituted by a projection (or a recess) provided on the lower surface of the lower plate 24 and a recess (or a projection) provided on the upper surface of the pressing member 14.

[0025] The pressing member 14 includes a circular-arc lower surface 14a that is convex downward in a side view of the bogie. To be specific, in a side view of the bogie 1, the pressing member 14 has such a shape as to gradually decrease in thickness from a middle portion thereof toward both car longitudinal direction end portions thereof. The lower surface 14a of the pressing member 14 presses the middle portion 13a of the plate spring 13 downward. The position of a center of the pressing member 14 in the car longitudinal direction coincides with the position of a center of the plate spring 13 in the car longitudinal direction.

[0026] The upper plate 26 is a flat plate extending in the car width direction, and the air spring 2 (see Fig. 1) is placed on an upper portion of the upper plate 26. When viewed from the car width direction, the upper plate 26 has a trapezoidal cross section such that each of grooves G for welding is formed between the upper plate 26 and each of the pair of cross beam main bodies 21. It should be noted that the upper plate 26 may have a recess that is recessed downward when viewed from the car width direction. The upper plate 26 contacts the first longitudinal member 31, the second longitudinal member 32, the first reinforcing member 34, and the second reinforcing member 35 from above. An upper surface of the upper plate 26 is welded and joined at the grooves G so as to be substantially flush with the upper surfaces of the

cross beam main bodies 21. Slits 26d are formed at respective portions of the upper plate 26 which portions overlap the first longitudinal member 31, the second longitudinal member 32, the first reinforcing member 34, and the second reinforcing member 35, respectively. For example, the slits 26d located right above the first longitudinal member 31 and the second longitudinal member 32 extend in the car longitudinal direction, and the slits 26d located right above the first reinforcing member 34 and the second reinforcing member 35 extend in the car width direction. The upper plate 26 is welded to the first longitudinal member 31, the second longitudinal member 32, the first reinforcing member 34, and the second reinforcing member 35 through the slits 26d. The first longitudinal member 31 and the second longitudinal member 32 are joined to the lower plate 24 in a state where the first longitudinal member 31 and the second longitudinal member 32 are arranged at positions which overlap the pressing member 14 when viewed from above. When viewed from above, the first longitudinal member 31 and the second longitudinal member 32 are arranged so as to be included within the pressing member 14. Each of the position of a center of the first longitudinal member 31 in the car width direction and the position of a center of the second longitudinal member 32 in the car width direction coincides with the position of a center of the pressing member 14 in the car width direction.

[0027] According to the above-described configuration, the lateral member 25 including the columnar member 33 into which the tubular portion 2a of the air spring 2 is inserted is inserted through the insertion space S1 formed at the longitudinal member 23. Therefore, the position of the air spring 2 in the car width direction can be changed only by changing the length of the lateral member 25 such that the position of the columnar member 33 of the lateral member 25 in the car width direction is changed. On this account, most parts of the bogie frame 4 can be standardized among the types of the cars among which the position of the air spring is different. Thus, the strength design of the bogie frame 4 is facilitated, and the design efficiency and the assembly work efficiency improve.

[0028] The first car longitudinal direction side surface of the first reinforcing member 34, the first car longitudinal direction side surface of the second reinforcing member 35, and the first car longitudinal direction side surface of the columnar member 33 are parallel to the car width direction and are formed on the same plane, and the second car longitudinal direction side surface of the first reinforcing member 34, the second car longitudinal direction side surface of the second reinforcing member 35, and the second car longitudinal direction side surface of the columnar member are parallel to the car width direction and are formed on the same plane. Therefore, even when the lateral member 25 is changed such that the position of the columnar member 33 of the lateral member 25 in the car width direction is changed, the position where the

lateral member 25 and the lower plate 24 are joined to each other is substantially the same, and therefore, the difference of the strength of the bogie frame 4 among the types of the cars among which the position of the air spring is different can be further suppressed.

[0029] The columnar member 33 penetrates the upper plate 26 extending between the pair of cross beam main bodies 21, and the upper plate 26 contacts the first reinforcing member 34, the second reinforcing member 35, and the like from above. Therefore, the air spring 2 can be stably supported by the upper plate 26 and also by the first reinforcing member 34, the second reinforcing member 35, and the like which support the upper plate 26 from below. The longitudinal member 23 is arranged at a position overlapping the pressing member 14 when viewed from above and is joined to the lower plate 24. Therefore, the load from the air spring 2 is transmitted through the longitudinal member 23, the lower plate 24, and the pressing member 14 to the plate spring 13 in the vertical direction. Thus, a biased load can be prevented from being transmitted from the pressing member 14 to the plate spring 13.

[0030] **Embodiment 2**

Fig. 8 is a side view of a railcar bogie 101 according to Embodiment 2. Fig. 9 is a plan view showing major components of a bogie frame 104 of the bogie 101 of Fig. 8. As shown in Fig. 8, the bogie 101 of the present embodiment includes the bogie frame 104 having an H shape in a plan view. Specifically, the bogie frame 104 includes a pair of side sills 128 and cross beam main bodies 121. The pair of side sills 128 are located at both respective sides in the car width direction and extend in the car longitudinal direction, and the cross beam main bodies 121 couple the pair of side sills 128 to each other and extend in the car width direction. Each of coil springs 113 as primary suspensions is interposed between a car longitudinal direction end portion of the side sill 128 and the axle box 9. Each of lower plates 124 is joined to lower surfaces of the pair of cross beam main bodies 121 so as to extend between the pair of cross beam main bodies 121. Each of upper plates 126 is joined to upper surfaces of the pair of cross beam main bodies 121 so as to extend between the pair of cross beam main bodies 121.

[0031] As shown in Fig. 9, the side sills 128 extending toward both car width direction sides of the pair of cross beam main bodies 121 are longitudinal members which are located at both respective car width direction side portions of the pair of cross beam main bodies 121 and are perpendicular to the cross beam main bodies 121. An insertion space S3 located between the pair of cross beam main bodies 121 and extending in the car width direction is formed at the side sill 128. Specifically, the insertion space S3 is a cutout which is formed at the side sill 128 and is open in the car width direction. The above-described lateral member 25 is inserted through the insertion space S3. It should be noted that a reinforcing member extending in the car width

direction may be provided inside the side sill without forming the cutout at the side sill 128. The lower end of the lateral member 25 is joined to an upper surface of the lower plate 124. An edge portion of the side sill 128 which portion forms the insertion space S3 is joined to the lateral member 25. According to the above configuration, even when the bogie frame 104 is a general bogie frame including the side sills 128, most parts of the bogie frame 104 can be standardized among the types of the cars in which the position of the air spring is different. Since the other components are the same as those of Embodiment 1, explanations thereof are omitted.

[0032] The present invention is not limited to the above embodiments, and modifications, additions, and eliminations may be made with respect to the configurations of the embodiments. Some of components in one embodiment may be applied to another embodiment. Some of components in an embodiment may be separated and extracted arbitrarily from the other components in the embodiment. For example, the insertion space S1 in Embodiment 1 may be a cutout formed at one longitudinal member coupling the pair of cross beam main bodies 21. Each of the cross sectional shape of the first longitudinal member 31 and the cross sectional shape of the second longitudinal member 32 is not limited to the inverted U shape and may be the other shape. Each of the cross sectional shape of the first reinforcing member 34 and the cross sectional shape of the second reinforcing member 35 is not limited to the inverted U shape and may be the other shape. The upper plate 26 is only required to be arranged under at least the air spring 2 and does not have to extend to the position above the coupling member 22. An installation height of the air spring 2 can be adjusted depending on the type of the car by changing the length of the tubular portion 2a. However, in a case where the upper plate 26 is configured to include a recess that supports the air spring 2 from below and is recessed downward when viewed from the car width direction, the installation height of the air spring can be changed depending on the type of the car by changing the depth of the recess of the upper plate 26 in designing.

Reference Signs List

- [0033]
- 1, 101 bogie
 - 2 air spring
 - 2a tubular portion
 - 3 carbody
 - 4, 104 bogie frame
 - 5 cross beam
 - 6 axle

- 8 bearing
- 9 axle box
- 13 plate spring
- 13a middle portion
- 13b end portion
- 14 pressing member
- 14a lower surface
- 21, 121 cross beam main body
- 23 longitudinal member
- 24 lower plate
- 25 lateral member
- 26 upper plate
- 26a through hole
- 26c recess
- 31 first longitudinal member
- 32 second longitudinal member
- 33 columnar member
- 34 first reinforcing member
- 35 second reinforcing member
- S1, S3 insertion space
- S2 inserting space

CLAIMS

1. A railcar bogie frame comprising:
 - a pair of cross beam main bodies extending in a car width direction;
 - longitudinal members located at both respective car width direction side portions of the pair of cross beam main bodies, the longitudinal members being perpendicular to the cross beam main bodies and including respective insertion spaces, the insertion spaces being located between the pair of cross beam main bodies and extending in the car width direction;
 - lower plates located at both respective car width direction side portions of the pair of cross beam main bodies and extending between the pair of cross beam main bodies; and
 - lateral members inserted through the respective insertion spaces and extending in the car width direction, the lateral members being joined to respective upper surfaces of the lower plates and also joined to respective edge portions of the longitudinal members which portions form the respective insertion spaces, wherein
 - each of the lateral members includes:
 - a columnar member including an inserting space into which a tubular portion is inserted, the tubular portion projecting downward from a bottom wall portion of an air spring;
 - and
 - a pair of reinforcing members adjacently arranged at both respective sides of the columnar member in the car width direction.
2. The railcar bogie frame according to claim 1, wherein:
 - first car longitudinal direction side surfaces of the pair of reinforcing members and a first car longitudinal direction side surface of the columnar member are parallel to the car width direction and are formed on the same plane; and
 - second car longitudinal direction side surfaces of the pair of reinforcing members and a second car longitudinal direction side surface of the columnar member are parallel to the car width direction and are formed on the same plane.
3. The railcar bogie frame according to claim 1 or 2, further comprising upper plates each arranged above the corresponding longitudinal member and the corresponding lateral member and extending between the pair of cross beam main bodies, wherein:
 - each of the upper plates includes a through hole through which the columnar member penetrates upward; and
 - each of the upper plates contacts upper surfaces of the corresponding pair of reinforcing members.
4. A railcar bogie comprising:

the railcar bogie frame according to any one of claims 1 to 3;
 a plurality of axle boxes accommodating a plurality of bearings supporting a plurality of axles; and

plate springs each extending in a car longitudinal direction and supported by a pair of axle boxes arranged away from each other in the car longitudinal direction among the plurality of axle boxes, the plate springs supporting the railcar bogie frame, wherein:

the railcar bogie frame includes pressing members attached to respective lower surfaces of the lower plates, the pressing members pressing respective longitudinal direction middle portions of the plate springs from above; and

the longitudinal members are arranged at respective positions overlapping the respective pressing members when viewed from above and are joined to the respective lower plates.

5. A railcar bogie comprising:

the railcar bogie frame according to any one of claims 1 to 3;

a plurality of axle boxes accommodating a plurality of bearings supporting a pair of axles; and

a plurality of axle box suspensions coupling the plurality of axle boxes to the railcar bogie frame, wherein

the longitudinal members are side sills extending toward both car width direction sides of the pair of cross beam main bodies.