## CLAIMS

1. A railcar bogie comprising:

a cross beam configured to support a carbody of a railcar;

a pair of front and rear axles sandwiching the cross beam and respectively arranged in front of and behind the cross beam in a railcar longitudinal direction so as to extend in a railcar width direction;

bearings respectively provided at both railcar width direction sides of each of the axles and configured to rotatably support the axles;

axle boxes configured to respectively accommodate the bearings;

plate springs extending in the railcar longitudinal direction;

contact members respectively provided at both railcar width direction end portions of the cross beam, respectively disposed separably on railcar longitudinal direction middle portions of the plate springs so as not to be fixed to the plate springs in an upper-lower direction; and

supporting members respectively provided at the axle boxes and respectively supporting the railcar longitudinal direction end portions of the plate springs, wherein

an upper surface of the railcar longitudinal direction middle portion of each of the plate springs has a substantially circular-arc shape that is convex downward in a side view.

2. The railcar bogie according to claim 1, wherein:

the supporting members are respectively provided at upper end portions of the axle boxes; and

the railcar longitudinal direction end portions of the plate springs are respectively disposed on the supporting members from above so as not to be fixed to the supporting members in the upper-lower direction.

3. The railcar bogie according to claim 1 or 2, wherein when a downward load applied to the cross beam increases, the plate springs elastically deform, and a contact

area between each of the plate springs and each of the contact members increases.

4. The railcar bogie according to any one of claims 1 to 3, wherein the plate springs include fiber-reinforced resin.

5. The railcar bogie according to claim 4, wherein at least one of a contact surface, contacting the contact member, of the plate spring and a contact surface, contacting the supporting member, of the plate spring is constituted by a covering member covered with the fiber-reinforced resin.

6. The railcar bogie according to claim 4, wherein:

at least one of a contact surface, contacting the plate spring, of the contact member and a contact surface, contacting the plate spring, of the supporting member is made of rubber; and

a contact surface, contacting the rubber, of the plate spring is made of the fiber-reinforced resin.

7. The railcar bogie according to any one of claims 1 to 6, wherein:

each of the plate springs includes a plurality of layers; and

a compressive strength of an upper layer portion out of the plurality of layers is higher than that of a lower layer portion out of the plurality of layers.

8. The railcar bogie according to claim 7, wherein the lower layer portion is thicker than the upper layer portion and made of fiber-reinforced resin.

9. The railcar bogie according to any one of claims 1 to 8, wherein a front-rear direction middle portion of each of the plate springs is located at a position lower than the railcar longitudinal direction end portions of the plate spring.

10. The railcar bogie according to any one of claims 1 to 9, wherein as a

downward load applied to the cross beam increases, and this causes elastic deformation of the plate spring, a shortest distance from a portion, contacting the contact member, of the plate spring to a portion, contacting the supporting member, of the plate spring becomes short.

11. The railcar bogie according to any one of claims 1 to 10, wherein

a contact surface, contacting the plate spring, of each of the contact members has a substantially circular-arc shape that is convex downward in a side view; and

in a side view, a curvature of the contact surface of the contact member is larger than that of a portion, contacting the contact member, of the plate spring.

12. The railcar bogie according to any one of claims 1 to 11, wherein

each of the contact members include

a main body portion constituted by a stiff member including a lower surface having a substantially circular-arc shape that is convex downward in a side view, and

an elastic member covering the lower surface of the main body portion and including a lower surface contacting the plate spring; and

when the plate spring elastically deforms, the lower surface of the elastic member follows an upper surface of the plate spring, that is, a state where the lower surface of the elastic member surface-contacts the upper surface of the plate spring is maintained.

13. The railcar bogie according to any one of claims 1 to 12, further comprising

coupling mechanisms each configured to couple the cross beam and each of the axle boxes, wherein

each of the plate springs is arranged such that a part thereof overlaps the coupling mechanism in a side view.

14. The railcar bogie according to any one of claims 1 to 13, wherein the contact member and the plate springs respectively include fitting portions that are fitted to each other in the upper-lower direction.

15. The railcar bogie according to any one of claims 1 to 14, wherein the cross beam is made by a cutting work of metal.

16. The railcar bogie according to any one of claims 1 to 15, wherein lower surfaces of the railcar longitudinal direction end portions of the plate springs are inclined relative to a horizontal surface.

17. The railcar bogie according to any one of claims 1 to 16, wherein each of the plate springs is formed in an arch shape that is convex downward as a whole in a side view.

CLAIMS

1. A railcar bogie comprising:

a cross beam configured to support a carbody of a railcar;

a pair of front and rear axles sandwiching the cross beam and respectively arranged in front of and behind the cross beam in a railcar longitudinal direction so as to extend in a railcar width direction;

bearings respectively provided at both railcar width direction sides of each of the axles and configured to rotatably support the axles;

axle boxes configured to respectively accommodate the bearings;

plate springs extending in the railcar longitudinal direction so as to respectively support both railcar width direction end portions of the cross beam and each including both railcar longitudinal direction end portions respectively supported by the axle boxes;

contact members respectively provided at both railcar width direction end portions of the cross beam and respectively disposed on railcar longitudinal direction middle portions of the plate springs so as not to be fixed to the plate springs in an upper-lower direction by separably contacting the railcar longitudinal direction middle portions of the plate springs; and

supporting members respectively provided at the axle boxes and respectively supporting the railcar longitudinal direction end portions of the plate springs, wherein

a contact surface, contacting the plate spring, of each of the contact members has a substantially circular-arc shape that is convex downward in a side view.

2. The railcar bogie according to claim 1, wherein:

the supporting members are respectively provided at upper end portions of the axle boxes; and

the railcar longitudinal direction end portions of the plate springs are respectively disposed on the supporting members from above so as not to be fixed to the supporting members in the upper-lower direction.

3. The railcar bogie according to claim 1 or 2, wherein when a downward load applied to the cross beam increases, the plate springs elastically deform, and a contact area between each of the plate springs and each of the contact members increases.

4. The railcar bogie according to any one of claims 1 to 3, wherein the plate springs include fiber-reinforced resin.

5. The railcar bogie according to claim 4, wherein at least one of a contact surface, contacting the contact member, of the plate spring and a contact surface, contacting the supporting member, of the plate spring is constituted by a covering member covered with the fiber-reinforced resin.

6. The railcar bogie according to claim 4, wherein:

at least one of a contact surface, contacting the plate spring, of the contact member and a contact surface, contacting the plate spring, of the supporting member is made of rubber; and

a contact surface, contacting the rubber, of the plate spring is made of the fiber-reinforced resin.

7. The railcar bogie according to any one of claims 1 to 6, wherein:

each of the plate springs includes a plurality of layers; and

a compressive strength of an upper layer portion out of the plurality of layers is higher than that of a lower layer portion out of the plurality of layers.

8. The railcar bogie according to claim 7, wherein the lower layer portion is thicker than the upper layer portion and made of fiber-reinforced resin.

9. The railcar bogie according to any one of claims 1 to 8, wherein a front-rear direction middle portion of each of the plate springs is located at a position lower than the railcar longitudinal direction end portions of the plate spring.

10. The railcar bogie according to any one of claims 1 to 9, wherein as a downward load applied to the cross beam increases, and this causes elastic deformation of the plate spring, a shortest distance from a portion, contacting the contact member, of the plate spring to a portion, contacting the supporting member, of the plate spring becomes short.

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in a side view, a curvature of the contact surface of the contact member is larger than that of a portion, contacting the contact member, of the plate spring.

12. The railcar bogie according to any one of claims 1 to 11, wherein:

each of the contact members include

a main body portion constituted by a stiff member including a lower surface having a substantially circular-arc shape that is convex downward in a side view, and

an elastic member covering the lower surface of the main body portion and including a lower surface contacting the plate spring; and

when the plate spring elastically deforms, the lower surface of the elastic member follows an upper surface of the plate spring, that is, a state where the lower surface of the elastic member surface-contacts the upper surface of the plate spring is maintained.

13. The railcar bogie according to any one of claims 1 to 12, further comprising

coupling mechanisms each configured to couple the cross beam and each of the axle boxes, wherein

each of the plate springs is arranged such that a part thereof overlaps the

coupling mechanism in a side view.

14. The railcar bogie according to any one of claims 1 to 13, wherein the contact member and the plate spring respectively include fitting portions that are fitted to each other in the upper-lower direction.

15. The railcar bogie according to any one of claims 1 to 14, wherein the cross beam is made by a cutting work of metal.

16. The railcar bogie according to any one of claims 1 to 15, wherein lower surfaces of the railcar longitudinal direction end portions of the plate springs are inclined relative to a horizontal surface.

17. The railcar bogie according to any one of claims 1 to 16, wherein each of the plate springs is formed in an arch shape that is convex downward as a whole in a side view.