

DESCRIPTION

Title of Invention: RAILCAR HEIGHT ADJUSTER AND RAILCAR HEIGHT ADJUSTER SET

Technical Field

[0001] The present disclosure relates to a railcar height adjuster and a railcar height adjuster set, which adjust the height of a railcar by adjusting a distance between a car body and a bogie.

Background Art

[0002] PTL 1 discloses a railcar air spring height adjuster that adjusts a relative displacement between a car body and a bogie by adjusting the supply and discharge of air to and from an air spring located between the car body and the bogie. This adjuster includes: an adjusting valve that adjusts internal pressure of the air spring; and an adjusting rod coupled to the adjusting valve. A receiving seat is fixed to a bogie frame. A fitting portion of an adjusting rod receiver supporting the height adjusting rod is fitted to a fitted portion of the receiving seat, and the adjusting rod receiver is fixed to the receiving seat with a bolt. Since a pair of left and right air springs are located on the bogie, the air spring height adjusters are located on both left and right sides of the bogie frame.

Citation List

Patent Literature

[0003] PTL 1: Japanese Laid-Open Patent Application Publication No. 2021-88201

Summary of Invention

Technical Problem

[0004] However, in the configuration disclosed in PTL 1, the fitting structure of the receiving seat and the adjusting rod receiver has a symmetric shape. Therefore, when attaching the adjusting rod receiver to the receiving seat, an operator may attempt to attach the adjusting rod receiver to the receiving seat in an incorrect orientation.

[0005] An object of one aspect of the present disclosure is to prevent an operator from attaching an adjusting rod receiver to a receiving seat in an incorrect orientation when assembling a railcar height adjuster.

Solution to Problem

[0006] A railcar height adjuster of the present disclosure includes: an adjusting valve that

adjusts air intake and exhaust of an air spring located between a car body and a bogie of a railcar; an arm that is coupled to the adjusting valve, includes one end portion, and extends in a horizontal direction; an adjusting rod that is coupled to the other end portion of the arm, includes an upper end portion, and extends in a vertical direction; a receiving seat that is located on an outside surface of a bogie frame of the bogie in a car width direction and includes an internal thread hole; an adjusting rod receiver including an adjusting rod support portion to which a lower end portion of the adjusting rod is attached, a positioning body that is fixed to the adjusting rod support portion and overlaps the receiving seat, and a bolt insertion hole corresponding to the internal thread hole; and at least one bolt that fixes the adjusting rod receiver to the receiving seat, wherein: the receiving seat includes a seat surface including a first surface facing outward in the car width direction and a second surface extending in the car width direction from an end of the first surface in a car longitudinal direction; the positioning body includes an attachment surface that conforms to a shape of the seat surface and contacts the seat surface; and when viewed from outside in the car width direction, the seat surface has an asymmetrical shape with respect to a virtual line passing through a center of the internal thread hole and extending in the vertical direction.

Advantageous Effects of Invention

[0007] According to the present disclosure, when viewed from the outside in the car width direction, the seat surface of the receiving seat has an asymmetrical shape with respect to the virtual line passing through the center of the internal thread hole and extending in the vertical direction. Therefore, when attaching the adjusting rod receiver to the receiving seat, the operator can easily recognize the correct orientation of the adjusting rod receiver with respect to the receiving seat. Thus, when assembling the railcar height adjuster, the operator can be prevented from attaching the adjusting rod receiver to the receiving seat in an incorrect orientation.

Brief Description of Drawings

[0008] FIG. 1 is a side view of a railcar according to Embodiment 1.

FIG. 2 is an explanatory diagram schematically showing a height adjuster located in the railcar of FIG. 1.

FIG. 3 is a plan view of a bogie of the railcar of FIG. 1.

FIG. 4 is a side view of the railcar when viewed in a direction indicated by arrows IV of FIG. 3.

FIG. 5 is a sectional view taken along line V-V of FIG. 4 and showing the height adjuster of the railcar.

FIG. 6 is a perspective view showing an attaching portion where a receiving seat and a positioning body are attached to each other in the height adjuster of FIG. 5.

FIG. 7 is a side view of the railcar when viewed in a direction indicated by arrows VII of FIG. 3.

FIG. 8 is a sectional view taken along line VIII-VIII of FIG. 7 and showing the height adjuster of the railcar.

FIG. 9 is a perspective view showing the attaching portion where the receiving seat and the positioning body are attached to each other in the height adjuster of the railcar according to Embodiment 2.

FIG. 10 is a perspective view showing the attaching portion where the receiving seat and the positioning body are attached to each other in the height adjuster of the railcar according to Embodiment 3.

FIG. 11 is a sectional view showing the attaching portion where the receiving seat and the positioning body are attached to each other in the height adjuster of FIG. 10.

Description of Embodiments

[0009] Embodiments will be described with reference to the drawings. In the following description, a direction in which a railcar travels and a car body extends is referred to as a car longitudinal direction (front-rear direction), and a lateral direction orthogonal to the car longitudinal direction is referred to as a car width direction (left-right direction).

[0010] Embodiment 1

FIG. 1 is a side view of a bogie 3 of a railcar 1 according to Embodiment 1. FIG. 2 is a schematic explanatory diagram for explaining a mechanism in which a height adjuster set 5 for the railcar 1 adjusts the height of a car body 2 in the railcar 1 configured by using the height adjuster set 5. FIG. 3 is a plan view of the bogie 3 of the railcar 1 of FIG. 1. As shown in FIGS. 1 to 3, the railcar 1 includes the car body 2, the bogie 3, and an air spring 4 located between the car body 2 and the bogie 3. The air spring 4 includes a first air spring 4a located on the left side of the bogie 3 and a second air spring 4b located on the right side of the bogie 3. The bogie 3 includes a bogie frame 6 supporting the car body 2 through the air spring 4. The bogie frame 6 includes: a cross beam 7 extending in the car width direction and supporting the car body 2; and a side sill 8 extending in the car longitudinal direction. The side sill 8 includes: a first side sill 8a extending in the car longitudinal direction on a side where the first air spring 4a

is located; and a second side sill 8b extending in the car longitudinal direction on a side where the second air spring 4b is located.

[0011] A pair of wheelsets 9 are located on both sides of the bogie frame 6 in the car longitudinal direction. Each wheelset 9 includes: an axle 9a extending in the car width direction; and wheels 9b located on both sides of the axle 9a in the car width direction. Both car-width-direction portions of the axle 9a are rotatably supported by bearings 10, and each bearing 10 is accommodated in an axle box 12 of an axle box suspension 11. The axle box suspension 11 is of an axle beam type, for example. An axle beam 13 extending from the axle box 12 is coupled to the side sill 8 by a coupler 14.

[0012] The railcar 1 includes the height adjuster set 5 that adjusts the height of the air spring 4 to adjust a distance between the car body 2 and the bogie 3, thereby adjusting the height of the car body 2. The height adjuster set 5 includes: a first height adjuster 5a located on the left side of the bogie 3; and a second height adjuster 5b located on the right side of the bogie 3. The first height adjuster 5a and the second height adjuster 5b have the same basic structure. Therefore, the following will representatively describe the first height adjuster 5a.

[0013] The first height adjuster 5a adjusts the height of the car body 2 relative to the bogie 3 by adjusting the amount of air supplied to the first air spring 4a and the amount of air discharged from the first air spring 4a. The first height adjuster 5a includes an adjusting valve 15 that adjusts air intake and exhaust of the first air spring 4a. The adjusting valve 15 is attached to the car body 2 and includes a pipe 16, an intake valve 17, and an exhaust valve 18. The pipe 16 includes: an intake channel 19 including an intake port that sucks compressed air from a compressed air supply source; and an exhaust channel 20 including an exhaust port that discharges air to the atmosphere.

[0014] The intake valve 17 includes: an intake valve chamber 24 constituting part of the intake channel 19; an intake valve body 21 that opens and closes the intake channel 19; and a spring 23 that biases the intake valve body 21 in such a direction that the intake valve body 21 closes. The exhaust valve 18 includes: an exhaust valve chamber 26 constituting part of the exhaust channel 20; an exhaust valve body 22 that opens and closes the exhaust channel 20; and a spring 25 that biases the exhaust valve body 22 in such a direction that the exhaust valve body 22 closes. The pipe 16 further includes a common channel 27 that causes the exhaust valve 18 to communicate with the inside of the air spring 4. To be specific, the common channel 27 achieves both the function of an intake channel and the function of an exhaust channel.

[0015] The first height adjuster 5a includes: an arm 28 extending in a horizontal direction and including a first end portion 28a coupled to the adjusting valve 15; an adjusting rod 29

extending in a vertical direction and including an upper end portion 29a coupled to a second end portion 28b of the arm 28; and an adjusting rod receiver 31 fixed to the bogie frame 6. A lower end portion of the adjusting rod 29 is coupled to the adjusting rod receiver 31. The adjusting rod 29 is located so as to extend in the vertical direction across a region between the car body 2 and the bogie 3 in the upper-lower direction. Although the adjusting rod 29 is not displaced relative to the bogie 3 in the upper-lower direction, it is displaceable relative to the car body 2 in the upper-lower direction. A cam 30 of the adjusting valve 15 is fixed to the first end portion 28a of the arm 28. The first end portion 28a of the arm 28 is supported by the car body 2 so as to be rotatable relative to the car body 2 about an axis extending in the car longitudinal direction and not to be displaced in the upper-lower direction or the horizontal direction. The second end portion 28b of the arm 28 is displaceable relative to the car body 2 in the upper-lower direction in accordance with the displacement of the adjusting rod 29 relative to the car body 2 in the upper-lower direction. The cam 30 projects upward from the first end portion 28a of the arm 28.

[0016] When the height of the car body 2 relative to the bogie 3 decreases, the distance between the car body 2 and the bogie 3 in the upper-lower direction decreases, and the adjusting rod 29 moves upward relative to the car body 2. Accordingly, the first end portion 28a of the arm 28 rotates, and a tip portion 30a of the cam 30 rotates so as to push the intake valve body 21 of the intake valve 17. At this time, the intake valve body 21 moves in association with the movement of the cam 30 against the spring 23 located inside the intake valve chamber 24. Thus, the intake valve 17 opens to allow air to flow through the intake channel 19, and compressed air is supplied to the first air spring 4a. As a result, the height of the first air spring 4a increases, and the height of the car body 2 relative to the bogie 3 increases.

[0017] When the height of the car body 2 relative to the bogie 3 increases, the distance between the car body 2 and the bogie 3 in the upper-lower direction increases, and the adjusting rod 29 moves downward relative to the car body 2. Accordingly, the first end portion 28a of the arm 28 rotates in the opposite direction, and the tip portion 30a of the cam 30 rotates so as to push the exhaust valve body 22 of the exhaust valve 18. Thus, the exhaust valve 18 opens, and air in the first air spring 4a is discharged from the exhaust channel 20 through the exhaust valve 18 to the atmosphere. As a result, the height of the first air spring 4a decreases, and the height of the car body 2 relative to the bogie 3 decreases.

[0018] FIG. 4 is a side view of the first height adjuster 5a of the railcar 1 when viewed in a direction indicated by arrows IV of FIG. 3. In FIG. 1, the adjusting valve 15 is schematically shown in order to explain the operation of the adjusting valve 15 of the first height adjuster 5a.

However, in FIG. 4, the adjusting valve 15 is shown in a size close to its actual size. As shown in FIG. 4, a lower end portion 29b of the adjusting rod receiver 31 is rotatably attached to the adjusting rod receiver 31 through a ball joint 35 and is pivotally supported by the adjusting rod receiver 31. The adjusting rod receiver 31 is located between the air spring 4a and the wheel 9b in the car longitudinal direction. The adjusting rod receiver 31 is located at a position inward of the axle beam 13 in the car longitudinal direction. The lower end portion 29b of the adjusting rod 29 is attached to a middle position of the adjusting rod receiver 31 in the car width direction.

[0019] FIG. 5 is a sectional view taken along line V-V of FIG. 4 and showing the side sill 8 and the height adjuster 5a. As shown in FIGS. 4 and 5, the adjusting rod receiver 31 includes an adjusting rod support portion 32 and a bogie fixing portion 33. The adjusting rod support portion 32 is fixed to a lower portion of the bogie fixing portion 33. The bogie fixing portion 33 includes: a bottom wall 39 including a main surface facing the car width direction; a side wall 40 projecting outward in the car width direction from one of ends of the bottom wall 39 which is located on a side close to the first air spring 4a in the car longitudinal direction; and a side wall 41 projecting outward in the car width direction from the other end of the bottom wall 39 which is located on a side far from the first air spring 4a in the car longitudinal direction. The adjusting rod support portion 32 is an adjusting rod support wall that is spaced apart from the bottom wall 39 outward in the car width direction and parallel to the bottom wall 39. The adjusting rod support portion 32 is fixed to the pair of side walls 40 and 41. The pair of side walls 40 and 41 cover the adjusting rod 29 in the car longitudinal direction.

[0020] The amount of projection of the side wall 40 at the middle portion and the upper portion of the adjusting rod receiver 31 is smaller than the amount of projection of the side wall 40 at a lower portion of the adjusting rod receiver 31. The side wall 41 exists only at the lower portion of the adjusting rod receiver 31. A portion of the bottom wall 39 which is located on a side far from the first air spring 4a in the car longitudinal direction is cut out. The adjusting rod receiver 31 has an asymmetrical shape with respect to a center line L1 of the adjusting rod receiver 31 which extends in the car width direction.

[0021] The adjusting rod support portion 32 of the adjusting rod receiver 31 includes a through hole 34. A screw 35a of the ball joint 35 located at the lower end portion 29b of the adjusting rod 29 is inserted into the through hole 34 and fixed to the adjusting rod support portion 32 by a nut 36. The adjusting rod 29 is located outside the adjusting rod support portion 32 in the car width direction. The lower end portion 29b of the adjusting rod 29 is located under the side sill 8.

[0022] A receiving seat 37 is attached to an outside surface 8c of the side sill 8 of the bogie

3 in the car width direction. The receiving seat 37 is fixed to the side sill 8 by welding. The receiving seat 37 includes an internal thread hole 38 that is open outward in the car width direction and extends in the car width direction.

[0023] The bogie fixing portion 33 of the adjusting rod receiver 31 further includes a positioning body 43. When attaching the adjusting rod receiver 31 to the receiving seat 37, the positioning body 43 is brought into contact with the receiving seat 37. The height adjuster 5a includes a bolt 46 that fixes the adjusting rod receiver 31 to the receiving seat 37. The bottom wall 39 of the adjusting rod receiver 31 includes a bolt insertion hole 44 at a position corresponding to the internal thread hole 38 of the receiving seat 37. The positioning body 43 includes a bolt insertion hole 45 at a position corresponding to the internal thread hole 38 of the receiving seat 37. Two pairs of the bolt insertion holes 44 and 45 are located so as to be lined up in the upper-lower direction.

[0024] When attaching the adjusting rod receiver 31 to the receiving seat 37, the bolt insertion holes 44 and 45 are aligned with the internal thread hole 38 of the receiving seat 37, and the bolt 46 is inserted into the bolt insertion hole 44 of an adjusting rod receiver main body portion 42 and the bolt insertion hole 45 of the positioning body 43 and threadedly engaged with the internal thread hole 38 of the receiving seat 37.

[0025] FIG. 6 is a perspective view showing a state before the adjusting rod receiver 31 is attached to the receiving seat 37. As shown in FIGS. 5 and 6, the positioning body 43 has an L shape when viewed from above. The positioning body 43 includes: a first portion 48 extending in the car longitudinal direction; and a second portion 49 extending in the car width direction. The receiving seat 37 includes a seat surface 50 that contacts the positioning body 43. The seat surface 50 includes: a first surface 51 facing outward in the car width direction; and a second surface 52 extending inward in the car width direction from an end of the first surface 51 in the car longitudinal direction. The first surface 51 and the second surface 52 of the receiving seat 37 extend in the vertical direction.

[0026] The positioning body 43 includes an attachment surface 85 that conforms to the shape of the seat surface 50 of the receiving seat 37 and contacts the seat surface 50. The attachment surface 85 of the positioning body 43 includes a first contact surface 53 and a second contact surface 54. The first contact surface 53 contacts the first surface 51 of the receiving seat 37, and the second contact surface 54 contacts the second surface 52 of the receiving seat 37. A surface of the first portion 48 of the positioning body 43 which faces inward in the car width direction is the first contact surface 53, and a surface of the second portion 49 of the positioning body 43 which faces a side close to the bolt insertion hole 45 in the car longitudinal

direction is the second contact surface 54.

[0027] The bolt insertion hole 45 of the positioning body 43 is located at a position that coincides with the internal thread hole 38 of the receiving seat 37 in a state where the first surface 51 of the receiving seat 37 and the first contact surface 53 of the positioning body 43 contact each other, and the second surface 52 of the receiving seat 37 and the second contact surface 54 of the positioning body 43 contact each other. Therefore, when the first surface 51 of the receiving seat 37 and the first contact surface 53 of the positioning body 43 contact each other, and the second surface 52 of the receiving seat 37 and the second contact surface 54 of the positioning body 43 contact each other, the bolt 46 can reach the internal thread hole 38 of the receiving seat 37 through the bolt insertion hole 45.

[0028] When viewed from the outside in the car width direction, the first surface 51 of the seat surface 50 of the receiving seat 37 has an asymmetrical shape with respect to a virtual line L2 passing through a center of the internal thread hole 38 and extending in the vertical direction. In the receiving seat 37, a distance a from the virtual line L2 to one of end portions thereof in the car longitudinal direction is shorter than a distance b from the virtual line L2 to the other end portion thereof in the car longitudinal direction ($a < b$). The seat surface 50 of the receiving seat 37 has an asymmetrical shape with respect to the virtual line L2. Therefore, the internal thread hole 38 of the receiving seat 37 is located on the first surface 51 so as to be offset toward the second surface 52 from a center line L3 passing through a center of the first surface 51 in the car longitudinal direction and extending in the vertical direction.

[0029] By bringing the first contact surface 53 of the positioning body 43 into contact with the first surface 51 of the receiving seat 37 and bringing the second contact surface 54 of the positioning body 43 into contact with the second surface 52 of the receiving seat 37, the positioning of the positioning body 43 with respect to the receiving seat 37 is performed. Thus, when viewed from the outside in the car width direction, the positioning body 43 is in the correct posture with respect to the receiving seat 37, and the two bolt insertion holes 45 of the positioning body 43 are aligned with the respective two internal thread holes 38 of the receiving seat 37.

[0030] In the positioning body 43, a distance from a portion where the first contact surface 53 and the second contact surface 54 intersect each other to a center of the bolt insertion hole 45 is the same as the distance a from the virtual line L2 of the receiving seat 37 to the one end portion in the car longitudinal direction. A distance from the center of the bolt insertion hole 45 of the first contact surface 53 of the positioning body 43 to an end opposite to the second contact surface 54 in the car longitudinal direction is not especially limited.

[0031] In the present embodiment, the second surface 52 of the receiving seat 37 is a machined surface. Therefore, the second surface 52 of the receiving seat 37 is formed with high accuracy. Moreover, the second contact surface 54 of the positioning body 43 is a machined surface. Therefore, the second contact surface 54 of the positioning body 43 is formed with high accuracy. As above, in the present embodiment, both the second surface 52 of the receiving seat 37 and the second contact surface 54 of the positioning body 43 are the machined surfaces. However, the present invention is not limited to the above embodiment. At least one of the second surface 52 of the receiving seat 37 or the second contact surface 54 of the positioning body 43 may be the machined surface. Moreover, in the present embodiment, the first surface 51 of the receiving seat 37 is also a machined surface. Moreover, the first contact surface 53 of the positioning body 43 is also a machined surface. Therefore, the first surface 51 of the receiving seat 37 and the first contact surface 53 of the positioning body 43 are also formed with high accuracy. It is not necessary that both the first surface 51 and the first contact surface 53 be the machined surfaces. Moreover, either the first surface 51 or the first contact surface 53 may be the machined surface, or both of them may be the machined surfaces.

[0032] The above embodiment has described the configuration of the first height adjuster 5a. The following will describe the configuration of the second height adjuster 5b. FIG. 7 is a side view of the second height adjuster 5b of the railcar 1 when viewed from the outside in the car width direction. FIG. 8 is a sectional view taken along line VIII-VIII of FIG. 7. The second height adjuster 5b differs from the first height adjuster 5a only in terms of the arrangement position, and the basic structure thereof is the same as that of the first height adjuster 5a. In a plan view of the bogie 3, the second height adjuster 5b is located at a position symmetrical about a center line L5 of the bogie 3 in the car width direction with respect to the first height adjuster 5a (FIG. 3). Therefore, the second height adjuster 5b is mirror-symmetrical with respect to the first height adjuster 5a. Thus, in the description of the second height adjuster 5b, the same reference signs are used for components common to those of the first height adjuster 5a, and explanations thereof are omitted.

[0033] Both the first height adjuster 5a and the second height adjuster 5b are located on the same side of the first air spring 4a and the second air spring 4b in the car longitudinal direction. The shapes of the receiving seat 37, the positioning body 43, and the adjusting rod receiver main body portion 42 of the second height adjuster 5b when viewed from one side (right side) of the bogie 3 in the car width direction are left-right reversed shapes with respect to the shapes of the receiving seat 37, the positioning body 43, and the adjusting rod receiver main body portion 42 of the first height adjuster 5a when viewed from the other side (left side) of the bogie 3 in the car

width direction. In the first height adjuster 5a, when viewed from the outside in the car width direction, part of the bottom wall 39 is located on the right side of the adjusting rod 29 in order to protect an attaching portion of the adjusting rod receiver 31 to the side sill 8. On the other hand, in the second height adjuster 5b, when viewed from the outside in the car width direction, part of the bottom wall 39 is located on the left side of the adjusting rod 29 in order to protect an attaching portion of the adjusting rod receiver 31 to the side sill 8.

[0034] As described above, the positioning body 43 of the second height adjuster 5b is located so as to be in the same orientation as the positioning body 43 of the first height adjuster 5a in the car longitudinal direction. The second portion 49 of the positioning body 43 of the second height adjuster 5b is located on the same side in the car longitudinal direction as the second portion 49 of the positioning body 43 of the first height adjuster 5a with respect to the center line L1 of the positioning body 43 in the car longitudinal direction. In other words, the orientation of the positioning body 43 of the first height adjuster 5a when viewed from the left side of the bogie 3 is opposite to the orientation of the positioning body 43 of the second height adjuster 5b when viewed from the right side of the bogie 3.

[0035] Both the second contact surface 54, which contacts the second surface 52 of the receiving seat 37, of the attachment surface 85 of the positioning body 43 of the first height adjuster 5a and the second contact surface 54, which contacts the second surface 52 of the receiving seat 37, of the attachment surface 85 of the positioning body 43 of the second height adjuster 5b face the same side in the car longitudinal direction. Specifically, the positioning body 43 of the first height adjuster 5a is located such that the second contact surface 54 thereof faces in a direction D1 toward the first air spring 4a along the car longitudinal direction. The positioning body 43 of the second height adjuster 5b is located such that the second contact surface 54 thereof faces in the direction D1 toward the second air spring 4b along the car longitudinal direction.

[0036] Conventionally, a fitting structure of a receiving seat and an adjusting rod receiver on the left side of a bogie and a fitting structure of a receiving seat and an adjusting rod receiver on the right side of the bogie were the same as each other. Therefore, there was a possibility that the adjusting rod receiver, which should be attached to the receiving seat on the left side of the bogie, might be erroneously attached to the receiving seat on the right side of the bogie. In contrast, according to the present embodiment, when viewed from the outside in the car width direction, the first surface 51 of the seat surface 50 of the receiving seat 37 has an asymmetrical shape with respect to the virtual line L2. Therefore, when an operator who performs the manufacturing of the bogie 3 attaches the adjusting rod receiver 31 to the receiving seat 37, the

operator can easily recognize the correct orientation of the adjusting rod receiver 31 with respect to the receiving seat 37. Thus, when assembling the first height adjuster 5a of the railcar 1, the operator can be prevented from attaching the adjusting rod receiver 31 to the receiving seat 37 in an incorrect orientation.

[0037] Moreover, the internal thread hole 38 of the receiving seat 37 is located on the first surface 51 so as to be offset toward the second surface 52 from the center line L3. Therefore, if the operator attempts to match the adjusting rod receiver 31 to the receiving seat 37 in an incorrect orientation, the bolt insertion holes 44 and 45 of the adjusting rod receiver 31 and the internal thread hole 38 are not aligned with each other. For example, even if the operator mistakenly attempts to attach the adjusting rod receiver 31 of the first height adjuster 5a to the receiving seat 37 of the second height adjuster 5b, the bolt insertion holes 44 and 45 of the positioning body 43 of the first height adjuster 5a are not aligned with the internal thread hole 38 of the receiving seat 37 of the second height adjuster 5b. Therefore, mistakenly attaching the positioning body 43 of the first height adjuster 5a to the receiving seat 37 of the second height adjuster 5b can be physically prevented. Accordingly, the incorrect attaching of the adjusting rod receiver 31 to the receiving seat 37 can be more surely prevented.

[0038] Moreover, since the second surface 52 of the receiving seat extends in the vertical direction, the positioning of the positioning body 43 with respect to the receiving seat 37 in the car longitudinal direction can be performed more accurately. Therefore, the adjusting rod receiver 31 can be prevented from being attached obliquely with respect to the vertical direction due to a clearance between the bolt 46 and the bolt insertion holes 44 and 45.

[0039] Moreover, at least one of the second surface 52 of the receiving seat 37 or the second contact surface 54 of the positioning body 43 is the machined surface. Therefore, when bringing the positioning body 43 into contact with the receiving seat 37 and positioning the adjusting rod receiver 31 in a vertical orientation, the attaching accuracy of the adjusting rod receiver 31 can be improved.

[0040] Moreover, both the second contact surface 54, which contacts the second surface 52 of the receiving seat 37, of the attachment surface 85 of the positioning body 43 of the first height adjuster 5a and the second contact surface 54, which contacts the second surface 52 of the receiving seat 37, of the attachment surface 85 of the positioning body 43 of the second height adjuster 5b face the same side in the car longitudinal direction. In other words, the orientation of the second contact surface 54, which contacts the second surface 52 of the receiving seat 37, of the positioning body 43 of the first height adjuster 5a when viewed from one side of the bogie 3 in the car width direction and the orientation of the second contact surface 54, which contacts

the second surface 52 of the receiving seat 37, of the positioning body 43 of the second height adjuster 5b when viewed from the other side of the bogie 3 in the car width direction are different from each other. In the present embodiment, both the second contact surface 54 of the positioning body 43 of the first height adjuster 5a and the second contact surface 54 of the positioning body 43 of the second height adjuster 5b face in the direction D1 toward the air spring 4. Thus, when assembling the bogie 3, the operator can more surely recognize whether or not the adjusting rod receiver 31 is attached in a correct orientation. Therefore, when the operator attaches the adjusting rod receiver 31 to the bogie 3, attaching the adjusting rod receiver 31 to the bogie 3 in an incorrect orientation can be more surely prevented.

[0041] By thoroughly enforcing a rule on the operator that the second contact surface 54 of the positioning body 43 faces in a specific direction along the car longitudinal direction with respect to the air spring 4, errors can be prevented in advance, and work efficiency can be improved. As the rule, it is exemplified that the second contact surface 54 of the positioning body 43 faces in the direction D1 toward the air spring 4 along the car longitudinal direction. However, the rule may specify that the second contact surface 54 of the positioning body 43 faces in a direction opposite to the direction D1 toward the air spring 4 along the car longitudinal direction.

[0042] The above embodiment has described that the second surface 52 of the receiving seat 37 extends inward in the car width direction from the first surface 51 facing outward in the car width direction. However, the present invention is not limited to the above embodiment. The second surface of the receiving seat 37 may extend outward in the car width direction from the first surface facing outward in the car width direction. Moreover, the second contact surface 54 of the positioning body 43 which contacts the second surface 52 of the receiving seat 37 may extend outward in the car width direction from an end of the first contact surface 53. As long as the second surface of the receiving seat and the second contact surface of the positioning body can contact each other, and the positioning of the positioning body in the car longitudinal direction can be performed, the second surface of the receiving seat may extend outward or inward in the car width direction from the first surface facing outward in the car width direction. To be specific, the second surface of the receiving seat may extend in the car width direction from the end of the first surface.

[0043] Moreover, in the above embodiment, as shown in FIG. 6, the side wall 40 and the side wall 41 largely project in the car width direction at a lower portion of the adjusting rod receiver main body portion 42. Thus, the lower portion of the adjusting rod receiver main body portion 42 has a U shape in which the side wall 40 and the side wall 41 are open outward in the

car width direction. However, the shape of the adjusting rod receiver main body portion 42 is not limited to the above embodiment. The lower portion of the adjusting rod receiver main body portion 42 may have an L shape in which only one of the side wall 40 and the side wall 41 projects outward in the car width direction. In this case, the adjusting rod support portion 32 may be fixed to a side wall that is one of the side wall 40 and the side wall 41 and projects outward in the car width direction, and the adjusting rod 29 may be fixed to the adjusting rod support portion 32. Moreover, the adjusting rod support portion 32 may be bent and fixed to the bottom wall 39 and the side wall that is one of the side wall 40 and the side wall 41 and projects outward in the car width direction, and the adjusting rod 29 may be fixed to the adjusting rod support portion 32. As above, the adjusting rod receiver main body portion 42 may have an L shape. As long as the adjusting rod receiver main body portion 42 can support the adjusting rod 29, the adjusting rod receiver main body portion 42 may have another shape.

[0044] **Embodiment 2**

Next, a railcar height adjuster set 5A according to Embodiment 2 will be described. FIG. 9 is a perspective view showing a receiving seat 55, a positioning body 60, and the adjusting rod receiver main body portion 42 in the railcar according to Embodiment 2 before the positioning body 60 and the adjusting rod receiver main body portion 42 are attached to the receiving seat 55. The same reference signs are used for components common to those of Embodiment 1, and explanations thereof are omitted. In Embodiment 2, the shape of a seat surface 56 of the receiving seat 55 and the shape of an attachment surface 86 of the positioning body 60 are different from those of Embodiment 1.

[0045] The receiving seat 55 includes the seat surface 56 that contacts the positioning body 60. The seat surface 56 includes: a first surface 57 facing outward in the car width direction; a second surface 58 extending inward in the car width direction from an end of the first surface 57 in the car longitudinal direction; and a third surface 59 extending in the car longitudinal direction from an end of the second surface 58 and facing outward in the car width direction.

[0046] The positioning body 60 includes the attachment surface 86 corresponding to the seat surface 56 of the receiving seat 55. The attachment surface 86 includes a first contact surface 61, a second contact surface 62, and a third contact surface 63. In the positioning body 60, a surface contacting the first surface 57 of the receiving seat 55 is the first contact surface 61, a surface contacting the second surface 58 of the receiving seat 55 is the second contact surface 62, and a surface corresponding to the third surface 59 of the receiving seat 55 is the third contact surface 63. In Embodiment 2, the combination of the adjusting rod receiver main body portion 42 and the positioning body 60 is referred to as an adjusting rod receiver 64.

[0047] In the present embodiment, by bringing the first contact surface 61 of the positioning body 60 into contact with the first surface 57, which faces outward in the car width direction, of the receiving seat 55 and bringing the second contact surface 62 of the positioning body 60 into contact with the second surface 58, which extends inward in the car width direction from an end of the first surface 57 in the car longitudinal direction, of the receiving seat 55, the positioning of the positioning body 60 with respect to the receiving seat 55 is performed. Therefore, the positioning between the receiving seat 55 and the positioning body 60 can be performed accurately. In the present embodiment, in a state where the first surface 57 of the receiving seat 55 and the first contact surface 61 of the positioning body 60 contact each other, and the second surface 58 of the receiving seat 55 and the second contact surface 62 of the positioning body 60 contact each other, the third surface 59 of the receiving seat 55 and the third contact surface 63 of the positioning body 60 do not contact each other, and a gap exists between the third surface 59 and the third contact surface 63 in the car width direction.

[0048] In Embodiment 2, when bringing the positioning body 60 into contact with the receiving seat 55, not both the contact between the first surface 57 of the receiving seat 55 and the first contact surface 61 of the positioning body 60 and the contact between the third surface 59 of the receiving seat 55 and the third contact surface 63 of the positioning body 60 are performed. Therefore, the first contact surface 61 and the third contact surface 63 of the positioning body 60 do not have to be formed with high accuracy. If bringing both the first contact surface 61 and the third contact surface 63 of the positioning body 60 into contact with the receiving seat 55, the positional accuracy between the first contact surface 61 and the third contact surface 63 of the positioning body 60 needs to be high, and this may increase the manufacturing cost of the positioning body 60. In the present embodiment, since it is not necessary to cause both the first contact surface 61 and the third contact surface 63 of the positioning body 60 to coincide with the receiving seat 55, the manufacturing cost of the positioning body 60 can be reduced.

[0049] By bringing the first contact surface 61 of the positioning body 60 into contact with the first surface 57 of the receiving seat 55 and positioning the positioning body 60, the positioning of the positioning body 60 in the car width direction can be performed accurately. Moreover, by bringing the second contact surface 62 of the positioning body 60 into contact with the second surface 58 of the receiving seat 55 and positioning the positioning body 60, the positioning of the positioning body 60 in the car longitudinal direction can be performed accurately. Thus, the positioning of the positioning body 60 with respect to the receiving seat 55 in the car longitudinal direction can be performed more accurately. Therefore, the adjusting

rod receiver 64 can be prevented from being attached obliquely with respect to the vertical direction due to a clearance between the bolt 46 and the bolt insertion holes 44 and 45.

[0050] In the present embodiment, when viewed from the outside in the car width direction, the first surface 57 of the seat surface 56 of the receiving seat 55 has an asymmetrical shape with respect to the virtual line L2 passing through the center of the internal thread hole 38 and extending in the vertical direction. In the present embodiment, in the receiving seat 55, a distance c from the virtual line L2 to one of end portions thereof in the car longitudinal direction is shorter than a distance d from the virtual line L2 to the other end portion thereof in the car longitudinal direction ($c < d$). Therefore, the internal thread hole 38 of the receiving seat 55 is located on the first surface 57 so as to be offset toward the second surface 58 from the center line L3 passing through a center of the first surface 57 in the car longitudinal direction and extending in the vertical direction. Since the shape of the first surface 57 is asymmetrical with respect to the virtual line L2, the shape of the attachment surface 86 of the positioning body 60 which contacts the seat surface 56 is also asymmetrical with respect to the virtual line L2.

[0051] In the positioning body 60, a distance from a portion where the first contact surface 61 and the second contact surface 62 intersect each other to the center of the bolt insertion hole 45 is the same as the distance c from the virtual line L2 to the one end portion of the receiving seat 55 in the car longitudinal direction. A distance from the center of the bolt insertion hole 45 of the first contact surface 61 of the positioning body 60 to an end thereof opposite to the second contact surface 62 in the car longitudinal direction is not especially limited.

[0052] In Embodiment 2, when viewed from the outside in the car width direction, the first surface 57 of the seat surface 56 of the receiving seat 55 has an asymmetrical shape with respect to the virtual line L2. Therefore, when the operator who performs the manufacturing of the bogie 3 attaches the adjusting rod receiver 64 to the receiving seat 55, the operator can easily recognize the correct orientation of the adjusting rod receiver 64 with respect to the receiving seat 55. Thus, when assembling the first height adjuster 5a and the second height adjuster 5b of the railcar 1, the operator can be prevented from attaching the adjusting rod receiver 64 to the receiving seat 55 in an incorrect orientation.

[0053] Also in Embodiment 2, the internal thread hole 38 of the receiving seat 55 is located on the first surface 57 so as to be offset toward the second surface 58 from the center line L3 in the car longitudinal direction. Therefore, if the operator attempts to match the adjusting rod receiver 64 to the receiving seat 55 in an incorrect orientation, the bolt insertion holes 44 and 45 of the adjusting rod receiver 64 and the internal thread hole 38 of the receiving seat 55 are not aligned with each other. Therefore, the operator can be physically prevented from matching the

adjusting rod receiver 64 to the receiving seat 55 in an incorrect orientation. Accordingly, the incorrect attaching of the adjusting rod receiver 64 to the receiving seat 55 can be surely prevented.

[0054] In Embodiment 2, the third surface 59 of the receiving seat 55 and the third contact surface 63 of the positioning body 60 do not contact each other, and the gap is secured between the third surface 59 and the third contact surface 63 in the car width direction. However, the present invention is not limited to the above embodiment. In addition to bringing the first contact surface 61 of the positioning body 60 into contact with the first surface 57 of the receiving seat 55 and bringing the second contact surface 62 of the positioning body 60 into contact with the second surface 58 of the receiving seat 55, the third surface 59 of the receiving seat 55 and the third contact surface 63 of the positioning body 60 may be brought into contact with each other.

[0055] By thoroughly enforcing a rule on the operator that the second contact surface 62 of the positioning body 60 faces in a specific direction along the car longitudinal direction with respect to the air spring 4, errors can be prevented in advance, and work efficiency can be improved. As with Embodiment 1, the rule may specify that the second contact surface 62 of the positioning body 60 faces in the direction D1 toward the air spring 4 along the car longitudinal direction. Moreover, the rule may specify that the second contact surface 62 of the positioning body 60 faces in a direction opposite to the direction D1 toward the air spring 4 along the car longitudinal direction.

[0056] The above embodiment has described that the second surface 58 of the receiving seat 55 extends inward in the car width direction from the first surface 57 facing outward in the car width direction. However, the present invention is not limited to the above embodiment. The second surface of the receiving seat 55 may extend outward in the car width direction from the first surface facing outward in the car width direction. Moreover, the second contact surface 62 of the positioning body 60 which contacts the second surface of the receiving seat 55 may extend outward in the car width direction from an end of the first contact surface 61. As long as the second surface of the receiving seat and the second contact surface of the positioning body can contact each other, and the positioning of the positioning body in the car longitudinal direction can be performed, the second surface of the receiving seat may extend outward or inward in the car width direction from the first surface facing outward in the car width direction. To be specific, the second surface of the receiving seat may extend in the car width direction from an end of the first surface.

[0057] **Embodiment 3**

Next, a railcar height adjuster set 5B according to Embodiment 3 will be described. FIG. 10 is a perspective view showing a receiving seat 65, a positioning body 72, and the adjusting rod receiver main body portion 42 in the railcar according to Embodiment 3 before the positioning body 72 and the adjusting rod receiver main body portion 42 are attached to the receiving seat 65. FIG. 11 is a sectional view showing an attaching portion where the positioning body 72 and the adjusting rod receiver main body portion 42 are attached to the receiving seat 65 in the railcar according to Embodiment 3. The same reference signs are used for components common to those of Embodiments 1 and 2, and explanations thereof are omitted. In Embodiment 3, the shape of a seat surface 66 of the receiving seat 65 and the shape of an attachment surface 87 of the positioning body 72 are different from those of Embodiments 1 and 2.

[0058] The receiving seat 65 includes the seat surface 66 that contacts the positioning body 72. The seat surface 66 includes a first surface 67, a second surface 68, a third surface 69, a fourth surface 70, and a fifth surface 71. The first surface 67 faces outward in the car width direction. The second surface 68 extends inward in the car width direction from one of ends of the first surface 67 in the car longitudinal direction. The third surface 69 extends in the car longitudinal direction from the other end of the second surface 68 and faces outward in the car width direction. The fourth surface 70 extends outward in the car width direction from the other end of the first surface 67 in the car longitudinal direction. The fifth surface 71 extends in the car longitudinal direction from an end of the fourth surface 70 and faces outward in the car width direction. In the present embodiment, the seat surface 66 of the receiving seat 65 includes: three seat surfaces that extend in the car longitudinal direction and the vertical direction and face outward in the car width direction; and two seat surfaces that extend in the car width direction and the vertical direction and face one side in the car longitudinal direction. The seat surface 66 has a stepped shape.

[0059] The positioning body 72 includes the attachment surface 87 corresponding to the shape of the seat surface 66. The attachment surface 87 includes a first contact surface 73, a second contact surface 74, a third contact surface 75, a fourth contact surface 76, and a fifth contact surface 77 which correspond to the first surface 67, the second surface 68, the third surface 69, the fourth surface 70, and the fifth surface 71 of the receiving seat 65, respectively. In the positioning body 72, a surface that contacts the first surface 67 of the receiving seat 65 is the first contact surface 73, a surface that contacts the second surface 68 of the receiving seat 65 is the second contact surface 74, a surface that corresponds to the third surface 69 of the receiving seat 65 is the third contact surface 75, a surface that contacts the fourth surface 70 of

the receiving seat 65 is the fourth contact surface 76, and a surface that corresponds to the fifth surface 71 of the receiving seat 65 is the fifth contact surface 77. In Embodiment 3, the combination of the adjusting rod receiver main body portion 42 and the positioning body 72 is referred to as an adjusting rod receiver 78.

[0060] In Embodiment 3, by bringing the first contact surface 73 of the positioning body 72 into contact with the first surface 67 of the receiving seat 65, bringing the second contact surface 74 of the positioning body 72 into contact with the second surface 68 of the receiving seat 65, and bringing the fourth contact surface 76 of the positioning body 72 into contact with the fourth surface 70 of the receiving seat 65, the receiving seat 65 and the positioning body 72 are brought into contact with each other. Therefore, the positioning between the receiving seat 65 and the positioning body 72 can be performed accurately. In the present embodiment, in a state where the first surface 67 of the receiving seat 65 and the first contact surface 73 of the positioning body 72 contact each other, the second surface 68 of the receiving seat 65 and the second contact surface 74 of the positioning body 72 contact each other, and the fourth surface 70 of the receiving seat 65 and the fourth contact surface 76 of the positioning body 72 contact each other, the third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72 do not contact each other, and the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72 do not contact each other. A gap c1 in the car width direction exists between the third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72, and a gap c2 in the car width direction exists between the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72 (FIG. 11).

[0061] By bringing the first contact surface 73 of the positioning body 72 into contact with the first surface 67 of the receiving seat 65 and positioning the positioning body, the positioning of the positioning body 72 in the car width direction can be performed accurately. Moreover, by bringing the second contact surface 73 of the positioning body 72 into contact with the second surface 68 of the receiving seat 65, bringing the fourth contact surface 74 of the positioning body 72 into contact with the fourth surface 70 of the receiving seat 65, and positioning the positioning body 72, the positioning of the positioning body 72 in the car longitudinal direction can be performed accurately. Thus, the positioning of the positioning body 72 and the adjusting rod receiver main body portion 42 with respect to the receiving seat 65 can be performed accurately. Therefore, the adjusting rod receiver 78 can be prevented from being attached obliquely with respect to the vertical direction due to a clearance between the bolt 46 and the bolt insertion holes 44 and 45.

[0062] In Embodiment 3, the positioning of the positioning body 72 with respect to the receiving seat 65 in the car longitudinal direction is performed using not only the second contact surface 73 but also the fourth contact surface 74. As above, the second surface 68 and the fourth surface 70 of the receiving seat may be included in a surface (second surface) that extends in the car width direction from an end of the first surface 67. To be specific, surfaces extending from the end of the first surface of the receiving seat may function as the surface (second surface) that extends in the car width direction from the end of the first surface. Moreover, by bringing the attachment surface 87 corresponding to these surfaces into contact with the seat surface of the receiving seat, the positioning of the positioning body in the car longitudinal direction may be performed.

[0063] According to the above configuration, if the operator attempts to match the adjusting rod receiver 78 to the receiving seat 65 in an incorrect orientation, the shape of the seat surface 66, having the stepped shape, of the receiving seat 65 and the shape of the contact surface 87 of the positioning body 72 do not coincide with each other. Therefore, when the operator matches the adjusting rod receiver 78 to the receiving seat 65 in an incorrect orientation, the operator can easily notice the mistake. Thus, the operator can correct the orientation of the adjusting rod receiver 78 to the correct orientation, and the operator can be prevented from matching the adjusting rod receiver 78 to the receiving seat 65 in an incorrect orientation. As a result, the incorrect attaching of the adjusting rod receiver 78 to the receiving seat 65 can be prevented.

[0064] In Embodiment 3, the receiving seat 65 is virtually divided into three block bodies that are: a first block body 79 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the first surface 67; a second block body 80 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the third surface 69; and a third block body 81 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the fifth surface 71. Moreover, the positioning body 72 is virtually divided into: a first block body 82 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the first contact surface 73; a second block body 83 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the third contact surface 75; and a third block body 84 that is a rectangular parallelepiped constituted by a portion extending in the vertical direction from the fifth contact surface 77. In the present embodiment, the gap exists between the third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72. Therefore, the second block body 80 of the receiving seat 65 and the second block body 83 of the positioning body 72 do not contribute to the positioning of the positioning body 72 in the car

width direction. Similarly, the gap exists between the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72. Therefore, the third block body 81 of the receiving seat 65 and the third block body 84 of the positioning body 72 do not contribute to the positioning of the positioning body 72 in the car width direction. Thus, for example, the second block body 80 may be removed from the receiving seat 65, and the third block body 84 may be removed from the positioning body 72. Even when the second block body 80 of the receiving seat 65 and the third block body 84 of the positioning body 72 are removed, the positioning of the positioning body 72 in the car width direction can be performed by bringing the first surface 67 of the receiving seat 65 and the first contact surface 73 of the positioning body 72 into contact with each other. Moreover, by bringing the second surface 68 of the receiving seat 65 and the second contact surface 74 of the positioning body 72 into contact with each other and bringing the fourth surface 70 of the receiving seat 65 and the fourth contact surface 76 of the positioning body 72 into contact with each other, the positioning of the positioning body 72 in the car longitudinal direction can be performed.

[0065] Moreover, in Embodiment 3, the gap exists between the third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72, and the gap exists between the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72. However, the present invention is not limited to the above embodiment. The third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72 may contact each other, and the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72 may contact each other. Moreover, either one of the contact between the third surface 69 of the receiving seat 65 and the third contact surface 75 of the positioning body 72 and the contact between the fifth surface 71 of the receiving seat 65 and the fifth contact surface 77 of the positioning body 72 may be established, and the other may not be established.

[0066] Moreover, also in Embodiment 3, by thoroughly enforcing a rule on the operator that the second contact surface 74 and the fourth contact surface 76 of the positioning body 72 face in a specific direction along the car longitudinal direction with respect to the air spring 4, errors can be prevented in advance, and work efficiency can be improved. The rule may specify that the second contact surface 74 and the fourth contact surface 76 of the positioning body 72 face in the direction D1 toward the air spring 4 along the car longitudinal direction. Moreover, the rule may specify that the second contact surface 74 and the fourth contact surface 76 of the positioning body 72 face in a direction opposite to the direction D1 toward the air spring 4 along the car longitudinal direction.

[0067] The foregoing has described the embodiments as examples of the technology disclosed in the present application. However, the technology in the present disclosure is not limited to these and is applicable to embodiments in which modifications, replacements, additions, omissions, and the like have been suitably made. Moreover, a new embodiment may be prepared by combining the components described in the above embodiments. For example, some of components or methods in one embodiment may be applied to another embodiment. Some components in an embodiment may be separated from the other components in the embodiment and arbitrarily extracted. Furthermore, the components shown in the attached drawings and the detailed explanations include not only components essential to solve the problems but also components for exemplifying the above technology and not essential to solve the problems.

[0068] The following aspects disclose preferred embodiments.

[0069] **First Aspect**

A railcar height adjuster including:

an adjusting valve that adjusts air intake and exhaust of an air spring located between a car body and a bogie of a railcar;

an arm that is coupled to the adjusting valve, includes one end portion, and extends in a horizontal direction;

an adjusting rod that is coupled to the other end portion of the arm, includes an upper end portion, and extends in a vertical direction;

a receiving seat that is located on an outside surface of a bogie frame of the bogie in a car width direction and includes an internal thread hole;

an adjusting rod receiver including

an adjusting rod support portion to which a lower end portion of the adjusting rod is attached,

a positioning body that is fixed to the adjusting rod support portion and overlaps the receiving seat, and

a bolt insertion hole corresponding to the internal thread hole; and

at least one bolt that fixes the adjusting rod receiver to the receiving seat, wherein:

the receiving seat includes a seat surface including

a first surface facing outward in the car width direction and

a second surface extending in the car width direction from an end of the first surface in a car longitudinal direction;

the positioning body includes an attachment surface that conforms to a shape of the

seat surface and contacts the seat surface; and

when viewed from outside in the car width direction, the seat surface has an asymmetrical shape with respect to a virtual line passing through a center of the internal thread hole and extending in the vertical direction.

[0070] **Second Aspect**

The railcar height adjuster according to the first aspect, wherein the internal thread hole is located on the first surface so as to be offset toward the second surface from a center line passing through a center of the first surface in the car longitudinal direction and extending in the vertical direction.

[0071] **Third Aspect**

The railcar height adjuster according to the first or second aspect, wherein the second surface of the receiving seat extends in the vertical direction.

[0072] **Fourth Aspect**

The railcar height adjuster according to any one of the first to third aspects, wherein at least one of the second surface of the receiving seat or a surface of the attachment surface of the positioning body of the adjusting rod receiver which contacts the second surface is a machined surface.

[0073] **Fifth Aspect**

A railcar height adjuster set that adjusts heights of a first air spring and a second air spring located between a car body and a bogie of a railcar,

the railcar height adjuster set including:

a first height adjuster that is the railcar height adjuster according to any one of claims 1 to 4, is located on one side of the bogie in the car width direction, is located on one side of the first air spring in the car longitudinal direction, and adjusts the height of the first air spring;

a second height adjuster that is the railcar height adjuster according to any one of the first to fourth aspects, is located on the other side of the bogie in the car width direction, is located on the one side of the first air spring in the car longitudinal direction, and adjusts the height of the second air spring, wherein

both a surface of the attachment surface of the positioning body of the first height adjuster which contacts the second surface and a surface of the attachment surface of the positioning body of the second height adjuster which contacts the second surface face the same side in the car longitudinal direction.

Reference Signs List

[0074]	1	railcar
	2	car body
	3	bogie
	4	air spring
	4a	first air spring
	4b	second air spring
	5	height adjuster set
	5a	first height adjuster
	5b	second height adjuster
	6	bogie frame
	8	side sill
	8c	outside surface
	15	adjusting valve
	28	arm
	29	adjusting rod
	29c	lower end portion
	31, 78	adjusting rod receiver
	32	adjusting rod support portion
	37, 55, 65	receiving seat
	38	internal thread hole
	43, 60, 72	positioning body
	44, 45	bolt insertion hole
	46	bolt
	50, 56, 66	seat surface
	51, 57, 67	first surface
	52, 58, 68	second surface
	53, 61, 73	first contact surface
	54, 62, 74	second contact surface
	85, 86, 87	attachment surface
	L2	virtual line

CLAIMS

[Claim 1] A railcar height adjuster comprising:

- an adjusting valve that adjusts air intake and exhaust of an air spring located between a car body and a bogie of a railcar;

- an arm that is coupled to the adjusting valve, includes one end portion, and extends in a horizontal direction;

- an adjusting rod that is coupled to the other end portion of the arm, includes an upper end portion, and extends in a vertical direction;

- a receiving seat that is located on an outside surface of a bogie frame of the bogie in a car width direction and includes an internal thread hole;

- an adjusting rod receiver including

- an adjusting rod support portion to which a lower end portion of the adjusting rod is attached,

- a positioning body that is fixed to the adjusting rod support portion and overlaps the receiving seat, and

- a bolt insertion hole corresponding to the internal thread hole; and

- at least one bolt that fixes the adjusting rod receiver to the receiving seat, wherein:

- the receiving seat includes a seat surface including

- a first surface facing outward in the car width direction and

- a second surface extending in the car width direction from an end of the first surface in a car longitudinal direction;

- the positioning body includes an attachment surface that conforms to a shape of the seat surface and contacts the seat surface; and

- when viewed from outside in the car width direction, the seat surface has an asymmetrical shape with respect to a virtual line passing through a center of the internal thread hole and extending in the vertical direction.

[Claim 2] The railcar height adjuster according to claim 1, wherein the internal thread hole is located on the first surface so as to be offset toward the second surface from a center line passing through a center of the first surface in the car longitudinal direction and extending in the vertical direction.

[Claim 3] The railcar height adjuster according to claim 1, wherein the second surface of the receiving seat extends in the vertical direction.

[Claim 4] The railcar height adjuster according to claim 3, wherein at least one of the second surface of the receiving seat or a surface of the attachment surface of the positioning body of the adjusting rod receiver which contacts the second surface is a machined surface.

[Claim 5] A railcar height adjuster set that adjusts heights of a first air spring and a second air spring located between a car body and a bogie of a railcar,

the railcar height adjuster set comprising:

a first height adjuster that is the railcar height adjuster according to any one of claims 1 to 4, is located on one side of the bogie in the car width direction, is located on one side of the first air spring in the car longitudinal direction, and adjusts the height of the first air spring;

a second height adjuster that is the railcar height adjuster according to any one of claims 1 to 4, is located on the other side of the bogie in the car width direction, is located on the one side of the first air spring in the car longitudinal direction, and adjusts the height of the second air spring, wherein

both a surface of the attachment surface of the positioning body of the first height adjuster which contacts the second surface and a surface of the attachment surface of the positioning body of the second height adjuster which contacts the second surface face the same side in the car longitudinal direction.