ARTICULATED RAILROAD CAR CONNECTION

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References Cited

UNITED STATES PATENTS

3,216,370 11/1965 Kulicke ............................................... 105/4


3,396,673 8/1968 Livelsbergert et al. ................................. 105/199 X


3,476,040 11/1969 Karakashian et al. ................................. 105/4

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ABSTRACT

An articulated car connection is provided with various improvements to reduce slack and to prevent undesirable interference between adjacent or abutting parts.

12 Claims, 4 Drawing Figures
3,646,604 ARTICULATED RAILROAD CAR CONNECTION

This invention relates generally to two-car railroad truck arrangements and more particularly to improvements in semipermanent connections supported upon a common car truck and pivotally connecting adjacent ends of railroad cars.

The patents U.S. Pat. Nos. to Kucieke 3,216,370, Livelsberger 3,396,673 and Weber 3,399,631 illustrate the general type of connection of the present invention, wherein the connection is provided between adjacent ends of railroad cars and is supported upon the bolster of a single truck. In general, a male member is secured to one car and a female member is secured to the other car and receives the male member in a telescoping arrangement. The respective members are held together around an axis of relative pivotal movement by a vertical pin extending through the connection and into the underlying bolster center plate of the truck. The connections usually comprise internal spherical surfaces to provide for flexibility and normally include separate wear-absorbing parts that may be replaced after prolonged use of the connection. Such articulated connections are designed to negotiate vertical curves in a horizontal plane, as they may be encountered during service conditions.

The use of internal parts in such connections in an abutting relationship and under high loads requires the maintenance of close tolerances to prevent possible binding and galling within the connection. For example, excessive slack between the male and female members may allow displacement and wedging of certain parts against others. Since many of the parts used are cast steel structures, the maintenance of tolerances to insure a proper nonyielding fit is often a hardship.

Accordingly, an object of this invention is to provide an improved articulated connection with such features as to minimize excessive wear on internal parts, notwithstanding the close tolerances required.

Another object is to provide a convenient procedure to minimize the longitudinal slack in such connections.

Other objects will become apparent from the following description and claims, taken in connection with the accompanying drawings, wherein:

FIG. 1 is a simplified side view of a railroad car made up of two sections, incorporating an articulated connection between the adjacent ends of said sections;

FIG. 2 is a vertical cross-sectional view of an articulated connection in which is incorporated the features of the presently described invention;

FIG. 3 is a plan view, partly in cross section, of the structure shown in FIG. 2.

FIG. 4 is a plan view of the novel pin bearing block used in connection with the structure shown in FIGS. 2 and 3.

With more particular reference to the drawings, FIG. 1 illustrates schematically the two sections of a railroad car, 10 and 12, the adjacent ends thereof being connected by an articulated connection 14, which is the subject of the present invention. The connection 14 is supported on a common four-wheel truck 16, which may be of any known type, and four-wheel trucks 18 support the outer ends of the sections 10 and 12.

The articulated connection allows for relative vertical rotational and lateral angular movement between the car sections 10 and 12, and attention is directed to FIGS. 2 and 3 showing the details of a preferred embodiment of such a connection. The end of an insert or male member 20 is secured to one of the car sections and an ambient or female member 22 having a funnel-shaped, open end cavity 23, is secured to the other car section along a common longitudinal axis X—X (FIG. 2) with said male member, said members engaging with one another in a telescoping relationship. The cavity 23 is substantially wider than the male member 20 to allow articulation of the connection. An annular boss 24 is formed on the underside of the female member 22 and is received upon the cup-shaped depression of the center plate 26 of the truck bolster 28, a portion of which is shown in outline in FIG. 2.

A vertical bore 30 is provided through the female member 22 for reception of a cylindrical pin 32, which defines the vertical axis Y—Y (FIG. 2) of relative pivotal movement between the members. An aperture 34 in the bottom of the pin 32 loosely receives a second pin 36 of a smaller diameter, which is in turn received in an opening 38 in the truck bolster center plate 26. It will be noted that the bottom of the larger pin 32 rests on the top of the center plate 26 of the bolster 28 at the top of the pin 32 comprises a horizontal member 42 in a horizontal opening 44 in the reduced diameter upper portion 45 of the pin and a U-shaped member 46, the free ends thereof being welded to the ends of the horizontal member. The horizontal member 42 is wider than the diameter of the bore 30, in order to prevent accidental dislodgement of the pin 32 in a downward direction when the articulated connection is separated from the underlying truck bolster 28 (FIG. 2). A retaining ring 48 in an annular recess 49 in the bore 30 prevents creeping-up of the pin after assembly.

The male member 20 has an outer end spherical surface 50 and a vertical opening 52 therethrough defining a spherical inner end surface 54. The vertical opening 52 also accommodates the pin 32 and a pin-bearing block 56 having a semicircular surface 58 surrounding a portion of the pin 32 and an end spherical surface 60 abutting and complementary with the spherical inner surface 54 of the male member 20.

It will be noted from FIGS. 3 and 4 that extensions 55 of the pin bearing block 56 define the semicircular surface 58 which encircles about one-half of the circumference of the pin, and rounded or spherical protrusions 62 are provided on both outer side surfaces of the pin-bearing block in the area of said extensions, said surfaces contacting an inner-circular side surface 64 (FIG. 3) of the male member opening 52. The pin-bearing block 56 is in contact with the male member 20 in the area of the protrusions 62 and the end spherical surface 60, but is otherwise normally spaced therefrom. The protrusions 62 provide further lateral support within the connection during lateral shifting of the male and female members with respect to one another than is found in other similar connections. As shown in FIGS. 2 and 4, the pin-bearing block 56 also comprises respective upper and lower annular planar surfaces 66 and 68 bearing respectively against the upper inner wall 70 and a lower annular hub 72 of the female member 22.

Provision is made in the connection to accommodate vertical angular movements of the male member 20 and female member 22 with respect to one another. For the purpose of lower angular clearance, an annular recess 74 (FIG. 2) surrounds the aforementioned hub 72 coaxial with the vertical axis Y—Y, said recess defining a spherical concave annular surface 76 disposed outward and upward with respect to said axis. One or more drain holes 73 and 75 extend from the bottom of the recess downward and outward through the annular boss and exit above the top of the truck bolster center plate 26. A ring 78 having an outer spherical convex annular surface 79 complementary with the spherical concave annular surface 76 is carried in the recess 74 and is suitably designed for universal tilting movement therein. A planar top surface 80 of the ring 78 supports the male member 20 on a similar continuous surface 82 thereof. To provide for upper angular clearance, the upper surface 84 of the male member 20 is sloped downward toward the spherical end 50 thereof.

The end spherical surface 50 of the male member 20 abuts a complementary spherical surface 86 of a follower block 88 positioned within the cavity 23 of the female member 22 and backed by a planar shim 90 against a flat end surface 91 of said cavity. In order to accurately position the follower block 88 within the cavity 23 and prevent undesirable movement thereof, sets of lugs are provided on the top, bottom and side interior walls of the female member 22 at 92, 93 and 94, respectively, said lugs defining a space for reception of the follower block. The casting of such lugs within the female member is advantageous, in that they may be chipped and ground to flatness and the distance between opposing lugs may be precisely adjusted to accommodate the particular follower block used with minimum tolerances.
Additional means are employed to prevent possible interference of the follower block 88 with the ring 78 and its recess 77. As shown in FIG. 2, in vertical section, the spherical end 50 of the male member 20 and the spherical convex surface 79 of the ring 78 are centric about a common point A defined by the intersection of axes X—X and Y—Y. The spherical radius R1 of the spherical end 50 is greater than the spherical radius R2 of the spherical convex surface 79 to provide additional clearance between the bottom of the follower block 88 and the ring 78, and a recess 95 is provided at the lower end of the male member 20 to provide clearance when the end of the female member is tilted downward with respect to the female member.

As shown in FIG. 2, the aforementioned shim 90 is supported by a horizontal ledge 96 (FIG. 2) extending into the female member cavity 23 from the end thereof, said ledge preferably being of a greater thickness than said shim and accommodated by a recess 97 in the follower block 88 to prevent interference therewith. As shown in FIG. 3, the shim 90 is supported laterally by similar vertical ledges 98 extending from the end of the female cavity 23, with suitable recesses 99 in the follower block 88 to accommodate said ledges.

The important of the shim 90 is to greatly minimize the longitudinal slack in the connection, in that the thickness of the shim may be conveniently sized to accommodate the slack found in a particular assembly. For this purpose, the connection is assembled with the shim omitted and the slack is measured as the possible relative distance of longitudinal movement between the male and female members when in a fully compressed and fully extended position. One convenient manner of measuring the slack is to select easily accessible vertical surfaces on the male and female members, such as those indicated at 100 and 101 respectively. The respective distances D1 and D2 are then measured when the members are fully telescoped together and fully extended, the difference being the desired thickness of the shim.

This procedure assures a final assembly that is substantially longitudinally nonyielding and overcomes the problem of manufacturing the abutting parts of the assembly to difficult-to-attain tolerances.

What is claimed is:

1. In a device for connecting the adjacent ends of railway cars including a female member secured to one of said ends and having an open end cavity therein, a male member secured to the other of said ends and received within said cavity, said members being located on a common longitudinal axis, a pin extending vertically through and pivotally connecting said members, and a follower block disposed between the end of said male member and the interior end surface of said cavity, the improvement comprising a shim disposed between said follower block and the interior end surface of said cavity, said shim being of such a thickness as to substantially compensate for slack along said longitudinal axis in said device.

2. The improvement of claim 1 wherein the thickness of said shim is selected to be substantially equal to the amount of available slack between the male and female members when the shim is omitted from the device.

3. The improvement of claim 1 wherein a ledge within said cavity supports said shim and vertical ledges within said cavity position said shim.

4. In a device for connecting the adjacent ends of railway cars including a female member secured to one of said ends and having an open end cavity therein defining interior surfaces, a male member secured to the other of said ends and received within said cavity, and a follower block disposed between the end of said male member and the interior end surface of said cavity, said follower block including top, bottom and side surfaces, the improvement comprising at least one lug projecting from said interior surfaces positioning each of the respective top, bottom and side surfaces of said follower block, said surfaces being spaced from the interior surfaces defined by said cavity.

5. In a device for connecting the adjacent ends of railway cars including a female member secured to one of said ends and having an open end cavity therein, a male member secured to the other of said ends, the end thereof being received within said cavity, and means for permitting vertical angulation between said female and male members, the improvement comprising a sloped surface on the top of said male member, said surface beginning at a location adjacent said means and sloping downward toward the end of said male member toward the interior of said cavity to permit clearance between said male and female members during vertical angulation thereof.

6. The invention according to claim 5 wherein the bottom of said male member is provided with a recess.

7. In a device for connecting the adjacent ends of railway cars including a female member secured to one of said ends and having an open end cavity therein, a male member secured to the other of said ends and received within said cavity, said male member having a spherical end surface abutting a concave spherical surface within said cavity, and a ring supporting said male member having a convex outer surface disposed within a cavity of said female member having a complementary concave annular surface to permit universal tilting of said ring therein, the improvement wherein the spherical end surface of said male member and the convex outer surface of said ring are concentric, and wherein the radius of the former is greater than the radius of the latter.

8. The improvement of claim 7 wherein the bottom surface of said male member has a recess near the end thereof to provide clearance during downward tilting of said male member.

9. The improvement of claim 7 wherein the upper surface of said male member adjacent the end thereof is sloped downward toward said end to provide clearance during upward tilting of said male member relative to said female member.

10. In a device for connecting the adjacent ends of railway cars including a female member secured to one of said ends and having an open end cavity therein, a male member secured to the other of said ends and received within said cavity, an annular boss on the bottom of said female member resting upon the center plate of an underlying truck bolster, and a pin pivotally interconnecting said male and female members and extending downward through an opening in said center plate, the improvement wherein the bottom of said pin rests on said center plate and is provided with a recess therein, and a second pin of smaller diameter than the first is disposed in said recess and extends downward through the opening in said center plate.

11. The improvement according to claim 10 wherein the first-mentioned pin has a handle at the top thereof, said handle being of a size sufficient to prevent downward displacement of said pin through said members.

12. The improvement according to claim 10 wherein means are provided for preventing upward displacement of said first-mentioned pin.

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