Sept. 5, 1967 H. B. WEBER 3,339,498

SNUBBED CAR TRUCK BOLSTER

Filed June 17, 1964 4 Sheets-Sheet 1

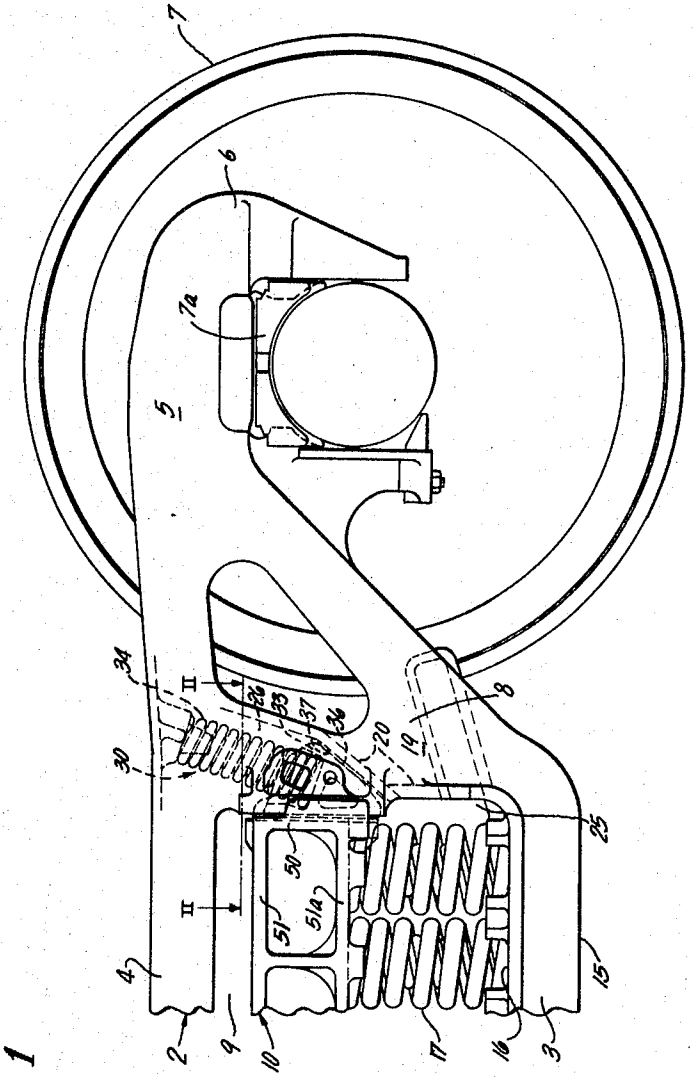


Fig. 1

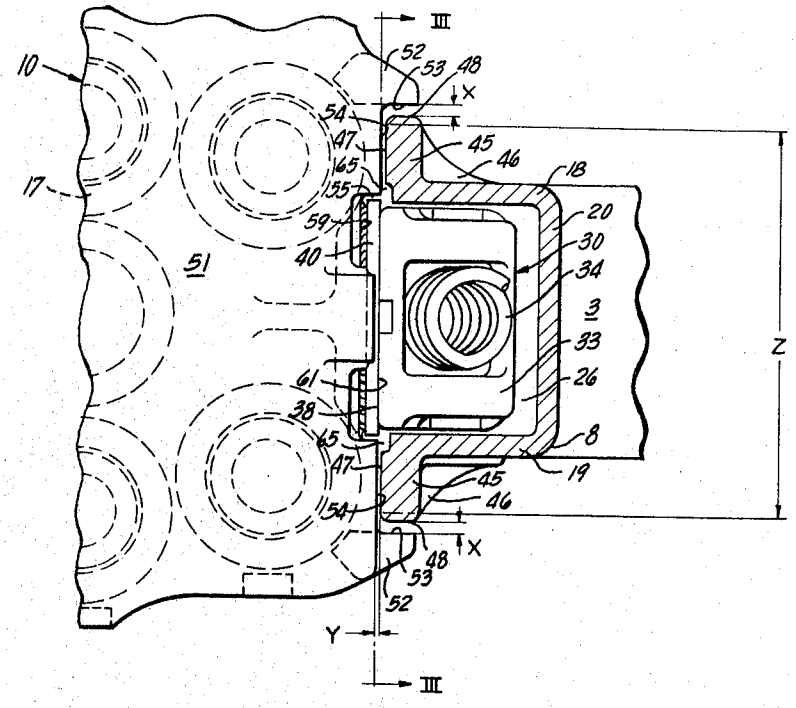
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SNUBBED CAR TRUCK BOLSTER

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Fig. 2



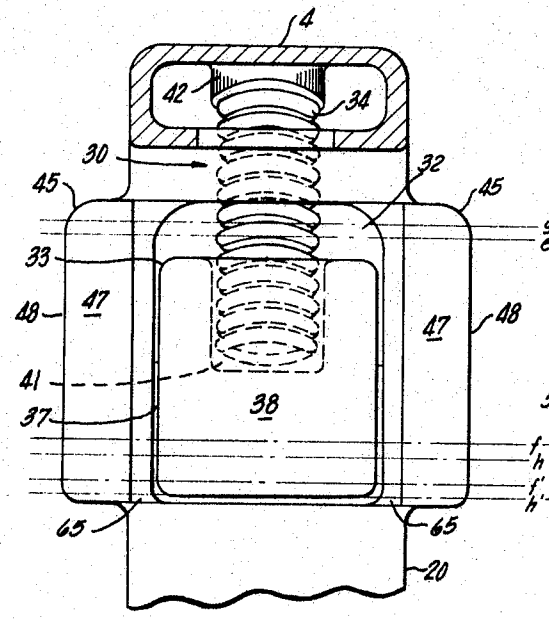


Fig. 3

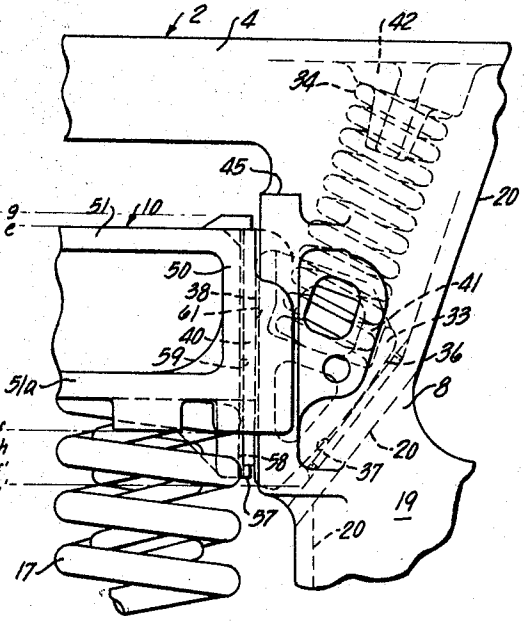


Fig. 4

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SNUBBED CAR TRUCK BOLSTER

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PRIOR ART

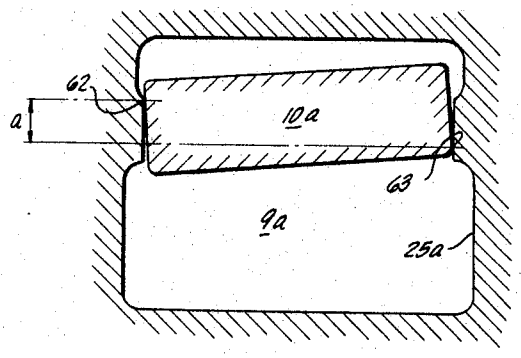


Fig. 5

PRIOR ART

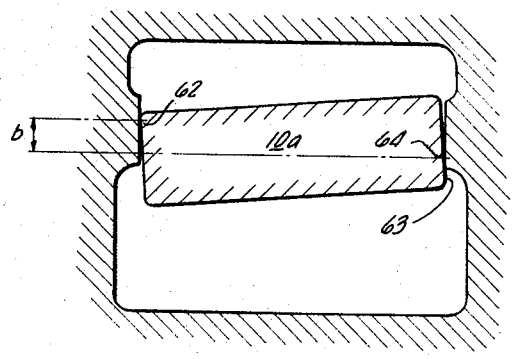


Fig. 6

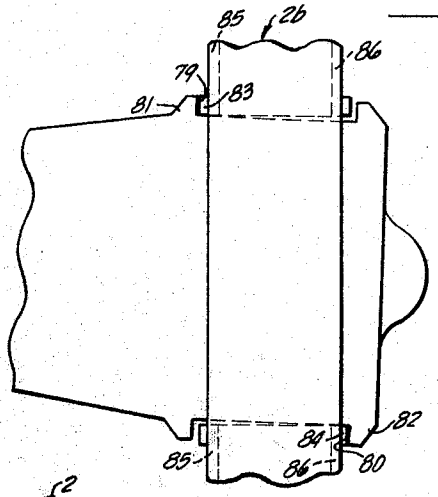


Fig. 8

PRIOR ART

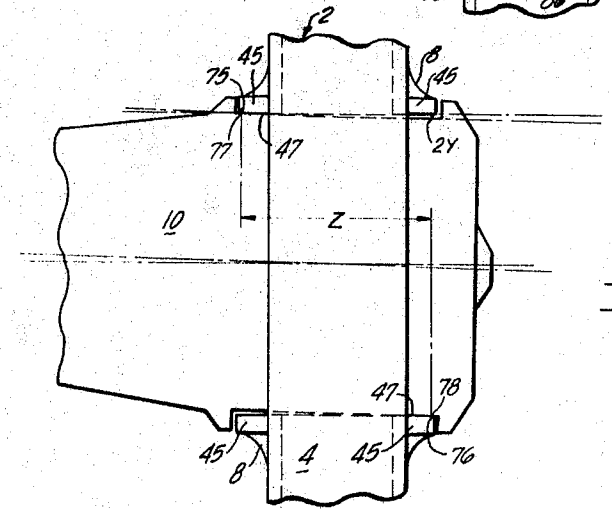


Fig. 7

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SNUBBED CAR TRUCK BOLSTER

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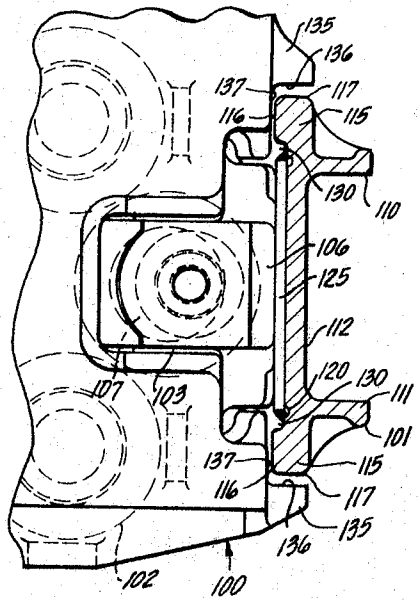


Fig. 9

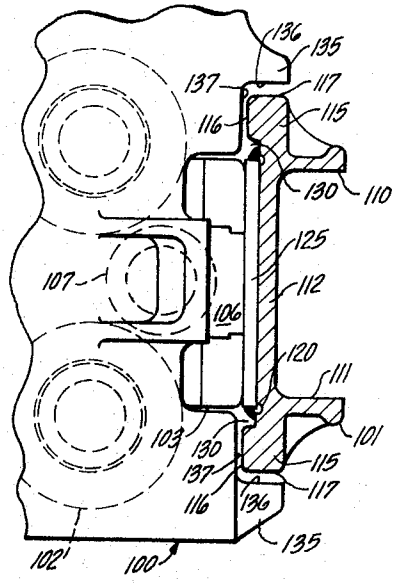


Fig. 10

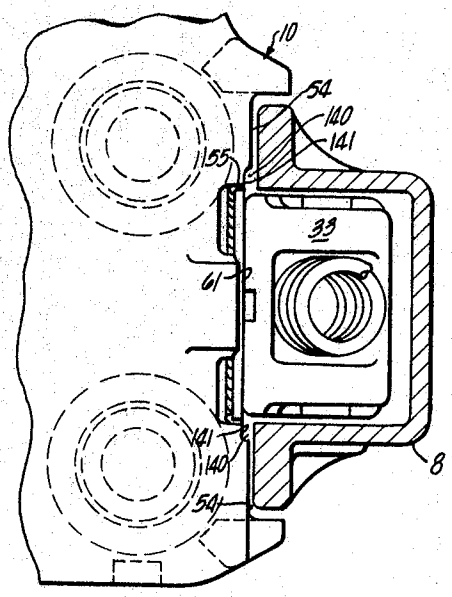


Fig. 11

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3,339,498
Patented Sept. 5, 1967

3,339,498

SNUBBED CAR TRUCK BOLSTER

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Filed June 17, 1964, Ser. No. 375,731
8 Claims. (Cl. 105—197)

This invention relates to railway snubbed car trucks, and more particularly to an improved side frame and bolster construction.

In railway truck design, it is well known that the bolster performs two main functions. The primary function is to maintain the spaced relation of the two side frames of a truck. The second is to limit the horizontal longitudinal movement of one frame relative to the other; i.e., preventing one side frame from leading the other. This latter function can be designated as "truck parallelogramming," which terminology is descriptive of a truck structure that is out of alignment; i.e., the longitudinal axis of the bolster is disposed at an angle within a horizontal plane other than 90° relative to the lengthwise direction of the side frame. This "out-of-square" relationship has been generally referred to as the horizontal angling of the bolster relative to the side frame.

In truss type side frame construction, the spaced vertical columns generally have bolster engaging surfaces which guide the bolster in a vertical path of movement as the railway car undergoes bouncing, pitching and swaying during service. These movements and various forces and impacts induce high bearing loads on the cooperating metal-to-metal engaging surfaces of the bolster and side frame. The wear accompanying such surface engagement increases the clearances between these cooperating surfaces to such an extent that the permissive degree of horizontal angling of the bolster in the truck assembly may be substantially exceeded within a desired service period.

Another problem associated with bolster and side frame construction is the irregular rotation of the bolster about its longitudinal axis during empty and fully-loaded car conditions wherein the rotation is induced, e.g., by impacting cars. Heretofore, the opposite sides of the bolster which engaged the opposed side frame columns during bolster rotation had a shorter vertical range of contact with the columns under fully loaded car conditions than under empty car conditions: Hence, the prior art bolster tilt or roll was greater than desired. When such bolster rotation occurred concurrently with the external forces mentioned above, irregular abrasive action occurred on the bolster, side frame and friction wedge.

It is therefore the primary object of this invention to provide a bloster and side frame structure that reduces the horizontal angling of the bolster relative to the side frame.

A correlative object to the preceding object is to provide adequate bearing surfaces between the bolster and side frame engaging surfaces to promote longer truck service life.

A further object is to provide cooperating bolster and side frame structure that will minimize bolster roll and limit bolster rotation under any normal condition of loading of the car.

In brief, the invention resides in a car truck comprising a bolster and side frame of special construction to limit

the extent to which one side frame can move out of exactly opposite relation with the other, and the angle through which a bolster may turn about its longitudinal axis within the car truck. To this end, each column of the side frame comprises a pair of vertically elongate flanges extending laterally outwardly from the side walls to provide wear surfaces of extra width and height facing the bolster portion disposed between the columns. The bolster, on the other hand, has complementary opposed surfaces adapted to engage the full width of the column surfaces, and vertically elongated lugs projecting longitudinally of the frame into flanking relation with the side frame flanges for maintaining proper transverse register of the bolster with the side frame. The clearances permitted between the opposed bolster and column surfaces and the overall width of the opposed bolster and side frame surfaces are held to a desired ratio or, geometrically speaking, the tangent of an angle, limiting the angular displacement of the bolster to a corresponding permissible angle out of perpendicular relation of the longitudinal axes of the bolster and the side frame. On account of the vertical length of the column surfaces, substantially the full height of the bolster surfaces is received between the column surfaces at all ranges of car loading to control bolster rotation about its axis.

In the drawings, with respect to which the invention is described below:

FIG. 1 is a fragmentary side elevation of the car truck in accordance with the invention.

FIG. 2 is an enlarged fragmentary plan view in transverse section taken along line II—II of the truck shown in FIG. 1;

FIG. 3 is an enlarged fragmentary elevation in transverse section taken along line III—III of the truck shown in FIG. 2;

FIG. 4 is an enlarged fragmentary side elevation of truck shown in FIG. 1;

FIG. 5 is a schematic fragmentary side elevation of a prior art tilted bolster in the bolster opening of the side frame upward of the bolster entry portion of the opening;

FIG. 6 is a schematic fragmentary side elevation of the tilted bolster illustrated in FIG. 5 generally disposed within the bolster opening and partly within the bolster entry portion thereof;

FIG. 7 is a fragmentary plan view of the bolster-side frame construction in accordance with the invention illustrating, in the horizontal plane, the transverse angular movement of the bolster relative to the side frame;

FIG. 8 is a fragmentary plan view of a prior art bolster in an out-of-square relationship relative to the side frame;

FIG. 9 is an enlarged fragmentary plan view in transverse section in accordance with another embodiment of the invention;

FIG. 10 is an enlarged fragmentary plan view similar to FIG. 9 of yet another embodiment of the invention; and

FIG. 11 is an enlarged fragmentary plan view of still another embodiment of the invention shown in transverse section.

Referring now to FIG. 1 of the drawings, a partial view of a snubbed railway car truck is illustrated. The truck comprises a side frame 2 having a tension member 3 and a compression member 4. The members merge as

at 5 and provide a pedestal jaw 6 for receiving a journal of a wheel and axle assembly 7 and an adaptor and bearing assembly 7*a* which receives the journal. Intermediate the lengthwise direction of the frame 2 there is positioned a pair of spaced vertical columns 8 (one of which is not shown). The columns connect the members 3 and 4 to form and partially define a bolster opening 9. The opening 9 receives one end of a bolster 10 arranged with its longitudinal axis transverse to the length of the frame 2. The tension member 3 includes a widened central portion 15 to provide a spring seat 16 for the accommodation of a spring group 17 that resiliently supports the end of the bolster 10.

Each column 8 comprises throughout its length, an inboard and an outboard vertical side wall 18 and 19, respectively. The walls 18 and 19 are structurally joined by a transverse wall 20. Wall 20 extends vertically upwardly from the tension member 3 adjacent to the seat 16 to form the side peripheral portion of an enlarged bolster-entry portion 25 of the opening 9. Midway of the height of the side walls, the wall 20 bends upwardly and away from the bolster opening to form, in combination with the side walls, a pocket 26.

To dampen the vertical and lateral oscillations of the bolster 10 and the supporting springs or spring group 17, the side frame 2 is provided with a friction mechanism. The friction mechanism is housed within the space between the planes of the side walls 18 and 19 and between portions of the bolster and side frame in transverse relation with the side frame length. In the embodiment shown in FIG. 1, the friction mechanism comprises a friction unit 30 that is confined within the pocket 26. Each pocket is in communication with the bolster opening 9 through a cored out section or window 32.

The friction unit illustrated in FIGS. 1 and 4 comprises a wedge 33 and a spring 34. The wedge is of the conventional type; that is, a sloping, downwardly facing surface 36 is provided on the wedge for complementary engagement with an upwardly facing surface 37 on a portion of the sloping transverse wall 20. A vertical surface 38 on the wedge complementally engages a vertical wear plate 40 which is structurally associated with the bolster 10. The wedge is recessed as at 41 to receive the lower end portion of the spring 34. The upper end portion of the spring engages a seat 42 disposed on the compression member 4. In operation, the spring urges the wedge downward into engagement with the plate 40 and wall 20 to snub the relative vertical and lateral movement of the bolster and the side frame.

Each wall 18 and 19 adjacent to the bolster opening 9 is provided with a vertically elongated flange or member 45 that projects laterally outwardly therefrom. Preferably, the flange projects outwardly to an extent exceeding 2½ times the average thickness of each wall. A pair of vertically spaced reinforcement ribs 46 structurally interconnect each flange with its associated wall. Each flange in cooperation with each wall defines a substantially planate column wear face 47 which partially bounds the bolster opening 9. Laterally remote from the mergence of each flange with its wall, there is provided an outwardly facing surface 48 that is generally coextensive with the face 47.

As illustrated in FIGS. 2 and 3, the laterally spaced faces 47 of each column are contained in a generally vertical plane disposed transversely of the length of the frame to provide two relatively large co-planar wear faces. The faces 47 are spaced in an overhanging relation from the upper vertical portion of the wall 20 to define the upper limit of the bolster entry portion 25. By providing a flange with a wear face 47 having an exceptionally large bearing area, the unit pressure per square inch created by the normal longitudinal thrust load encountered in service on the side frame is substantially reduced. Hence, the abrasive wearing action on the frame is decreased, thus promoting longer side frame life.

The bolster illustrated in FIGS. 1, 2 and 4 is of general box-shaped construction at each end and comprises spaced vertical side walls 50, 50 (one of which is not shown) adjacent to each end. Spaced horizontal walls 51 and 51*a* structurally join the side walls. A pair of laterally spaced and vertically extending guide lugs 52, 52 project outwardly from the bolster side walls into a flanking relation with the flanges 45, 45 of the adjacent column 8. These lugs are primarily intended to retain the bolster end within the bolster opening 9. Lugs 52, 52 are each provided with an inwardly facing vertical surface 53 that is in spaced juxtaposed relation with the surface 48 of the column flange 45. This spaced relationship between the surfaces of the lug and flange is designed to a predetedmined clearance X and defines one-half the lateral extent (2X) of the transverse horizontal movement of the bolster relative to the side frame.

Disposed lengthwise of the bolster between each pair of lugs 52, 52 there is provided a pair of spaced planate guide surfaces 54, 54 on the vertical side walls 50, 50 which face horizontally away from the bolster axis. These surfaces are contained in a common vertical plane parallel to the longitudinal axis of the bolster. Each guide surface 54 adjoins with a lug 52 and is in spaced opposed relation with the wear face 47 of the flange immediately adjacent to the lug 52. In addition, each guide surface 54 is complementary with its respective flange surface and is adapted to engage therewith in guided cooperating relation. The spaced relation between the guide surface and wear face is designed to a predetermined distance Y and defines one-half the amount of horizontal movement (2Y) that the bolster may traverse relative to the side frame in its lengthwise direction.

Recessed horizontally into each bolster wall 50 centrally of the lugs 52, 52 and guide surfaces 54, 54 is a vertically extending cavity 55 opposite the window 32. Depending from the horizontal wall 51*a* on each side of the longitudinal axis of the bolster and subjacent to the cavity is a bolster extension 57 having a vertical surface 58 in registry with an outwardly facing surface 59 of the cavity. Surfaces 58 and 59 therefore present a planar surface spaced inwardly from the guide surfaces 54. Positioned within the cavity in abutting relation with the planar surfaces 58 and 59, there is the wear plate 40. The wear plate has a vertical frictional working surface 61; the collocation of which, relative to the common vertical plane containing the guide surfaces 54, 54 is one of coincidence.

As is well known in the railway art, longitudinal carbody impacts on the bolster or severe use of the brakes tend to rotate the bolster about its longitudinal axis. The degree of this bolster roll is dependent upon the horizontally spaced relation between the engaging bolster and side frame surfaces and the spacing along a vertical plane between diagonally opposite portions of the bolster that contact the vertical surfaces of the side frame. FIG. 5 schematically illustrates a prior art tilted bolsted 10*a*, in an empty car condition. Bolster rotation under this condition is limited by vertically spaced diagonally opposite portions 62 and 63 that engage the peripheral walls of the bolster opening 9*a*. FIG. 6 schematically illustrates the same tilted bolster in a fully loaded car condition; i.e., the position that the bolster would assume: (1) when the associated car is fully loaded with lading, (2) when the lower position of the bolster is reached during bolster displacement under normal spring action and horizontal forces between the car body and the truck producing maximum bolster roll. Under this condition, the lower portion 63 of the tilted bolster is disposed within the bolster entry portion 25*a* and the bolster engages the peripheral wall at 64. Since the vertical spacing *b* between the diagonally opposite engaging portions of the bolster shown in FIG. 6 is less than the spacing *a* as shown in FIG. 5, the degree of bolster rotation is greater. FIGS. 3 and 4 indicate horizontal lines *e*, *f*, *h*, *f'* and *h'*,

wherein *e* and *f* represent the top and bottom extremity of the guide surfaces **54, 54** under normal empty car static conditions, *g* and *h* represent the top and bottom positions under normal spring action assumed by extremities *e* and *f* during service under empty car conditions, and *f'* and *h'* represent the positions assumed by *f* and *h* under normal loaded car conditions. The wear faces **47, 47** on the elongated flanges **45, 45** extend above and below the normal positions *g* and *h'*, assumed by the top and bottom extremities of the guide surfaces **54, 54** under normal empty and loaded car conditions, respectively. Such flange structure enables diagonally opposite portions of the bolster to fully engage the wear faces **47** on the flanges **45**. Thus, the vertical extent of the flanges exceeds the range of movement defined by the bolster as it traverses a bolster displacement range from an upper empty car position to a lower fully loaded car position. As a result, the same degree of bolster rotation is maintained under all normal conditions of loading.

To avoid the possibility of damaging either the lower portion of the wear plate **40** or the bolster extension **57** during such rotational movement of the bolster, each flange **45** immediately adjacent the window **32** is provided with a vertical recess **65** which is generally coextensive with the face **47**. Each recess permits the entry thereof of the wear plate or bolster extension during such rotational movement of the bolster, even under conditions of such horizontal displacement of the bolster sidewise of the side frame as to bring a bolster lug **52** in contact with a flange **45**.

The structure described hereinabove permits the predetermined distance Y to be reduced from a commonly used clearance exceeding $\frac{3}{32}$ of an inch to a nominal clearance of $\frac{3}{32}$ of an inch along the full height of the wear faces. This affords the same degree of bolster rotation for both empty and loaded car conditions. Furthermore, in reducing the spacing between the wear face of the column and the guide surface of the bolster, while at the same time increasing the overall effective width of the co-planar wear faces, the transverse angling movement in the horizontal plane of the bolster relative to the side frame is substantially reduced.

In the embodiment illustrated in FIGS. 2 and 7, the bolster **10** is limited in its angular horizontal movement relative to the frame **2** by the engagement of horizontally diagonally opposite portions **75** and **76** on the guide surfaces of the bolster with the laterally remote surfaces **77** and **78** on the horizontally diagonally opposite wear faces **47** of the flanges **45**.

Heretofore, bolster lugs or gibs have been used as one method of limiting such angular movement. As shown in FIG. 8, one common practice was to permit inwardly facing surfaces **79** and **80** on lugs **81** and **82** to engage the outer surfaces on vertically extending pads **83** and **84** of each column wall **85** and **86** immediately adjacent the bolster opening. Such practice not only limited the flexibility of the snubbed truck in the lengthwise direction of the bolster **10***b*, but also promoted excessive wear on the respective bolster lug surfaces **79** and **80** and the outer surfaces on the extending pads **83** and **84**. This, in turn, increased the angular range of movement in the horizontal plane of the bolster **10***b* relative to the frame **2***b*. ing the bolster opening. The bolster of this prior art

Another method was to provide a vertically elongated flange on each column wall in horizontally spaced relation to the periphery of the bolster opening. That is, spaced on each wall from the bolster opening there was provided a flange having a vertical abutment surface facing the bolster opening. The bolster of this prior art truck has four lugs, each of which engages one of the above named flange surfaces. These respective lugs and flanges provide for only a limited area of wear. Hence, after a short period of in-service use, the wear on these surfaces, due to the vertical movement of the bolster relative to the side frame, increased the clearance therebetween. This permitted a larger degree of horizontal bolster angling or truck parallelogramming.

Thus, the invention disclosed herein describes an improved method for maintaining the bolster in a square relation relative to the side frame with a minimum degree of wear. In the embodiment illustrated in FIGS. 1 through 4 and 7 the minimum amount of horizontal angling is on the order of 0°42'. This much is deemed to be needed for adjustment of the truck parts to normal track unevenness and other normal operating conditions. The maximum angling is on the order of 2°6', with a preferred value of angling at 1°0'. This angular relationship is determined by the angle whose tangent is $2Y/Z$ wherein Y is equal to the predetermined distance hereinabove described and Z is substantially equal to the overall width of contact of the side frame faces **47** with the horizontal diagonally opposite guide surfaces **54** of the bolster. It is to be noted that since the predetermined clearance X is greater than the predetermined distance Y, the lateral flexibility of the bolster relative to the side frame is independent of the transverse horizontal angling relationship. Hence, the clearance X may be increased, if desired, to provide for a greater degree of lateral movement.

FIGS. 9 and 10 illustrate a modification of the invention wherein the car truck has snubbing mechanism carried in the bolster. In these figures there is illustrated a partial plan view of a bolster **100** disposed within a bolster opening adjacent to a side frame vertical column **101**. Shown in dot-dash line is a spring group **102** which resiliently supports the bolster in the conventional manner. The bolster is provided with a pair of pockets **103, 103** (one of which is not shown) at each end. Each pocket is disposed on opposite sides of the bolster's longitudinal axis in adjacent relation to the vertical column **101**. Within each pocket there is provided a friction wedge **106**. A spring **107** urges the wedge outwardly of the pocket.

Briefly, the vertical column is of C-shaped horizontal cross section comprising an inboard and an outboard side wall, **110** and **111**, respectively and a transverse wall **112** which structurally unites the side walls. As in the preferred embodiment, vertically elongated flanges **115, 115** are provided adjacent to the bolster opening. On the margin of each flange bordering the bolster opening, there are situated planate column wear faces **116, 116**. Immediately adjacent to the face **116** on the lateral exterior of each flange **115**, there is an outwardly facing surface **117**. In combination, each flange **115** cooperates with the transverse wall **112**, in horizontal section, to define a centrally located depression **120** intermediate the wear faces. Affixed to the wall **112** and occupying the depression, there is a wear plate **125**. The wear plate has an overall transverse width less than the width of the depression **120** to provide, in combination with the laterally spaced walls of the depression, a pair of recesses **130, 130**.

The bolster is provided with a pair of lugs **135, 135** having oppositely facing surfaces **136, 136** and a pair of coplanar guide surfaces **137, 137** similar to the preferred embodiment. Basically, the bolster cooperates with the column in the same manner as heretofore described to achieve the same results; that is, limited bolster rotation about its longitudinal axis independent of the vertical displacement of the bolster and limited horizontal angling of the bolster in the horizontal plane transverse to the length of the side frame.

FIG. 11 illustrates another embodiment which is similar to that of FIG. 2 except for a pair of recesses **140, 140** that are disposed on the bolster **10** instead of on the vertical column **8**. As another difference, the friction wedge **33** extends outwardly of the pocket, in excess of that as shown in FIG. 2, an amount substantially equal to the depth of the recesses **140**. The cavity **55**, housing the wear plate **40**, is positioned inwardly from the coplaner guide surfaces **54, 54** a substantially equivalent amount. As illustrated, each recess adjoins the cavity **55**

and the guide surface **54**. Each recess presents a surface **141** facing outwardly from the bolster axis in approximately the same plane as the vertical working surface **61** of the wear plate **40**. Such a structural arrangement permits movement of the bolster relative to the side frame to the extent, if necessary, that a corner of the wedge **33** occupies a recess **140**.

The bolster preferably carries structure such as the bolster extensions **57** as found in the earlier described preferred embodiment. Thus, since the bolster extension and wear plate are spaced further from the flanges than as shown in FIG. 2, the engagement thereof with the flanges is avoided during bolster rotation.

The invention as described hereinabove reduces the possible parallelogramming of the railway car truck by providing structure for maintaining a given and required clearance between the side frame and bolster, i.e., a larger working base for the two horizontally diagonally opposite points of contact between the side frame and bolster end portion. This arrangement reduces the possible deviation in the horizontal plane that the bolster may angle relative to the side frame.

Furthermore, the invention limits the degree of bolster rotation about its longitudinal axis under all conditions of normal railway car loading and provides a protecting structure for bolster extensions under conditions of maximum bolster roll.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention of excluding such equivalents of the invention described or portions thereof as fall within the scope of the claims.

What is claimed is:

1. A snubbed railway car truck comprising:

(A) a side frame having a pair of vertical columns spaced in the lengthwise direction of the frame to define a bolster opening, and a pair of side walls;

(1) each column comprising portions of both walls, and each wall merging with a vertically elongated flange projecting laterally outward from the side walls and cooperating therewith to define a substantially planate column wear face partially forming the periphery of said opening with both faces of a column being in the same general vertical transverse plane,

(2) each flange having a lateral outwardly facing surface generally coextensive with the face thereof;

(B) a bolster with its longitudinal axis arranged transversely of said frame having an end portion extending through said opening for guided vertical movement with respect to the side frame;

(1) said bolster comprising a pair of vertical guide lugs on each side of said axis extending outwardly therefrom and into flanking relation with the flanges of the adjacent column,

(2) each pair of lugs having opposed vertical surfaces with each surface spaced in juxtaposed relation, at a predetermined clearance, with one of said flange surfaces and engageable therewith to restrict the lateral displacement of the bolster relative to the side frame,

(3) said bolster having disposed between said lugs, a pair of spaced planate guide surfaces in a common vertical plane parallel to said axis,

(4) each guide surface being immediately adjacent one of said lugs and in spaced opposed relation, at a predetermined distance, with one of said faces and engageable therewith to restrict the horizontal movement of the bolster lengthwise of the frame; said predetermined clearance exceeding said predetermined distance; and

(C) wherein the bolster is adapted to angle horizontally with respect to said side frame an angular amount as determined by the sum of the predetermined distances between both sides of the bolster guide surfaces and the column wear faces divided by the overall width of contact of the side frame wear faces and the opposing guide surfaces of the bolster, said angle being in the range of tangent 0°42′ to tangent 2°6′.

2. The railway car truck of claim **1** wherein:

(A) each of said wear faces has a transverse width exceeding 2½ times the transverse width of the adjoining side wall.

3. The railway car truck of claim **1** wherein:

(A) each of said faces has a vertically extending recess laterally inwardly adjacent its laterally inward edge for receiving a vertical extension of the bolster upon rotation of the bolster about its longitudinal axis, said recess having a lateral width exceeding said predetermined clearance.

4. The railway car truck of claim **1** wherein:

(A) said bolster comprises a pair of spaced recesses disposed on each side of said axis, each recess being laterally remote from each of said lugs and adjacent to and generally coextensive with each of said spaced guide surfaces and each of said recesses having a lateral width exceeding the predetermined clearance.

5. A snubbed railway car truck comprising:

(A) a side frame having a pair of columns at opposite sides of a bolster opening;

(B) a bolster with its longitudinal axis arranged transversely of said frame and having an end portion disposed in said opening;

(C) resilient means for supporting the bolster through a desired range of vertical movement within said opening;

(D) a pair of stop means on each side of said axis comprising members of the bolster and the side frame for restricting the longitudinal movement of the bolster relative to the frame in said range, said stop means have opposed bolster and side frame cooperating surfaces, said bolster cooperating surfaces being in flanking relation at a predetermined clearance with said side frame cooperating surfaces;

(E) a pair of guide means on each side of said axis disposed between said stop means comprising members of the bolster and the side frame for substantially restricting relative movement of the bolster in the side frame to angular movements in a horizontal plane in said range and rotational movements of the bolster about its axis in said range;

(F) friction means comprising members cooperating with the bolster and the side frame between said guide means for resisting vertical and lateral movements of said bolster relative to said frame; and

(G) said guide means having opposed bolster and side frame guide surfaces having an overall width of contact measured horizontally and perpendicularly to the side frame length and a total distance between said members in the longitudinal direction of the side frame such that the quotient of said distance divided by said width is in the range of tangent 0°42′ to tangent 2°6′, said guide surfaces being in spaced opposed relation at a predetermined distance, and said predetermined clearance exceeds said predetermined distance so that said guide surfaces arrest the horizontal angling of the bolster prior to the engagement of the diagonally opposite stop means.

6. The railway car truck of claim **5** wherein:

(A) means are associated with said guide surfaces for receiving a portion of said friction means upon movement of the bolster in its lengthwise direction.

7. The railway car truck of claim **5** wherein:

(A) means are associated with said guide surfaces for receiving a portion of said friction means upon rotation of the bolster about its longitudinal axis within said range of movement.

8. The railway car truck of claim **5** wherein:

(A) said bolster guide surfaces have vertically diagonally opposite top and bottom portions engageable with said side frame guide surfaces to limit the rotation of the bolster about its longitudinal axis, said side frame guide surfaces having a vertical length providing full contact with opposed bolster surfaces over the range of movement of the bolster to thereby limit the bolster rotation to a constant angle of rotation under any normal condition of loading of the car.

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