Sept. 16, 1941. D. S. BARROWS 2,255,960

RAILWAY TRUCK

Filed Sept. 15, 1938 4 Sheets-Sheet 1

Fig. 1.

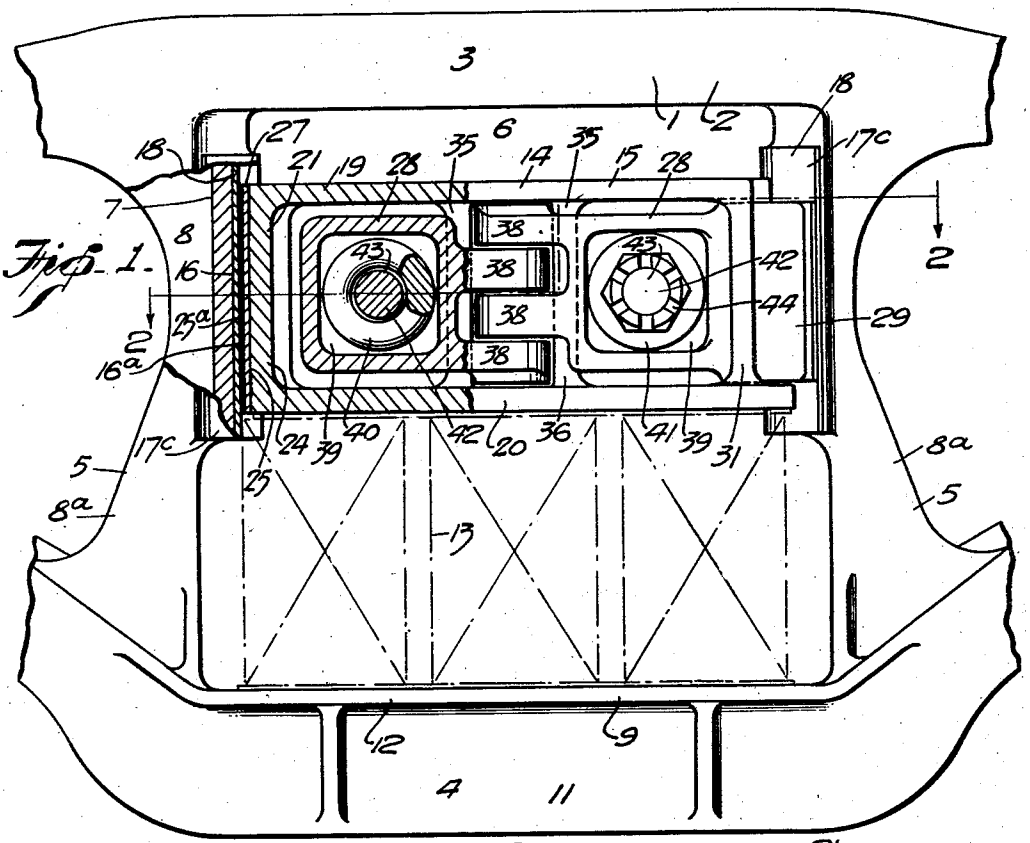
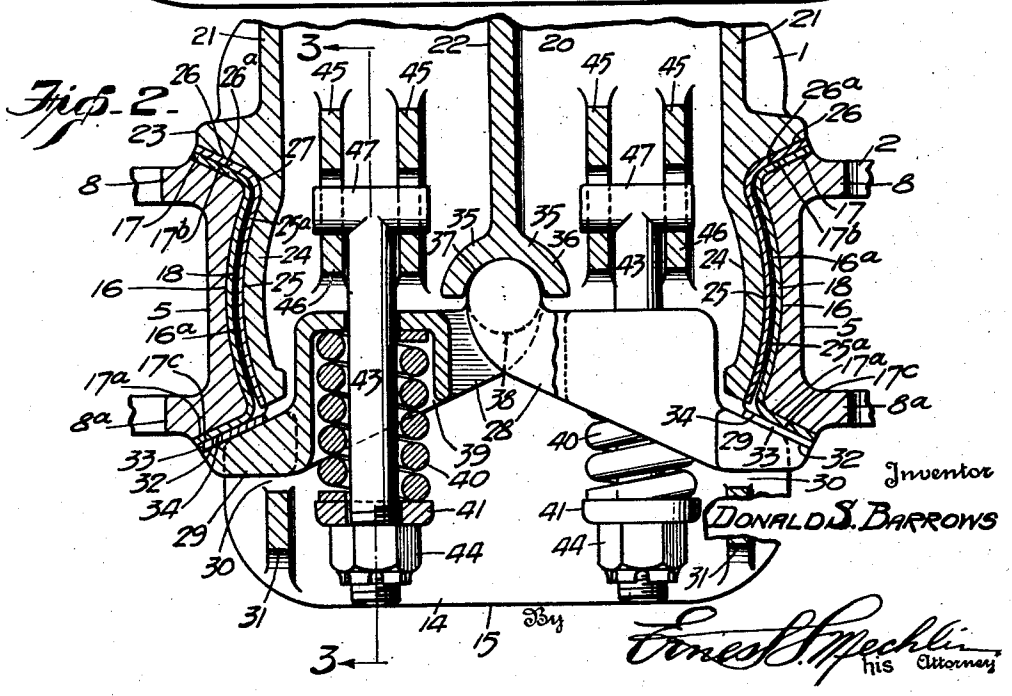


Fig. 2.



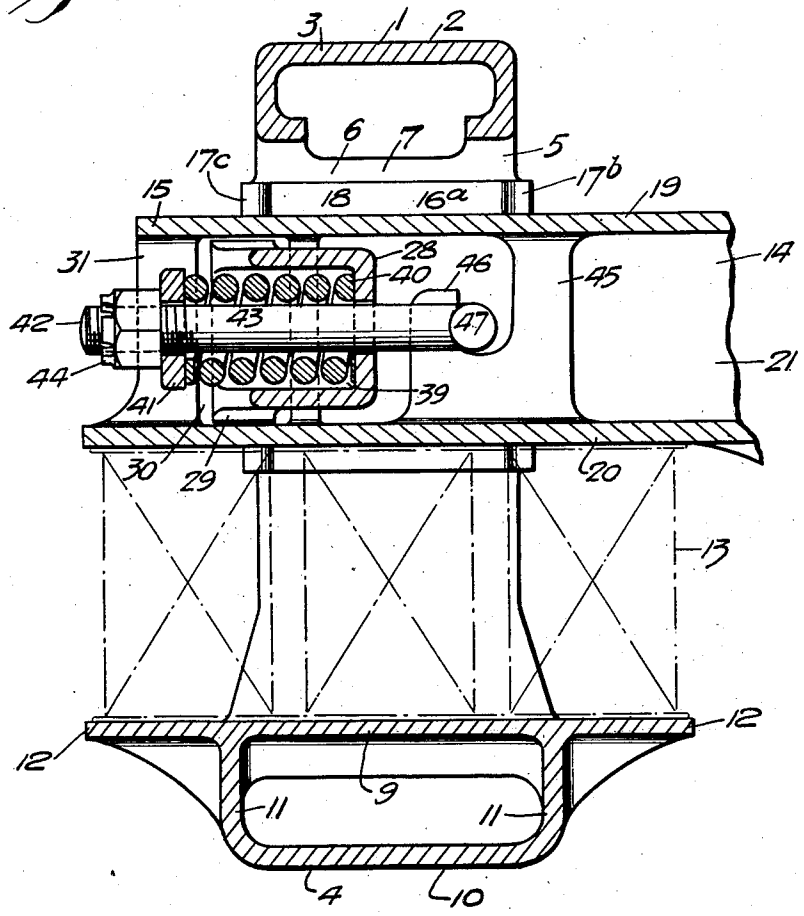
Inventor
DONALD S. BARROWS
By Ernest J. Mechlin
his Attorney

Sept. 16, 1941. D. S. BARROWS 2,255,960

RAILWAY TRUCK

Filed Sept. 15, 1938 4 Sheets-Sheet 2

Fig. 3.



Inventor

DONALD S. BARROWS

By Ernest J. Mechlin
his Attorney

Sept. 16, 1941. D. S. BARROWS 2,255,960

RAILWAY TRUCK

Filed Sept. 15, 1938 4 Sheets-Sheet 3

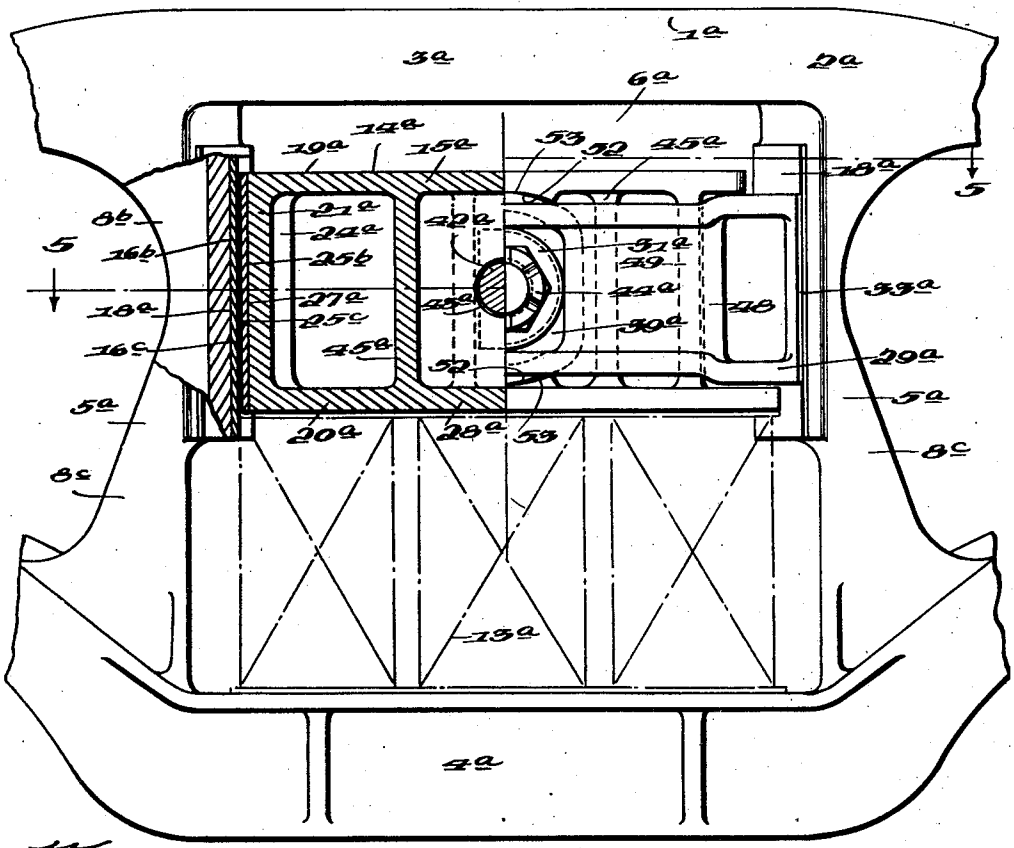


Fig. 4.

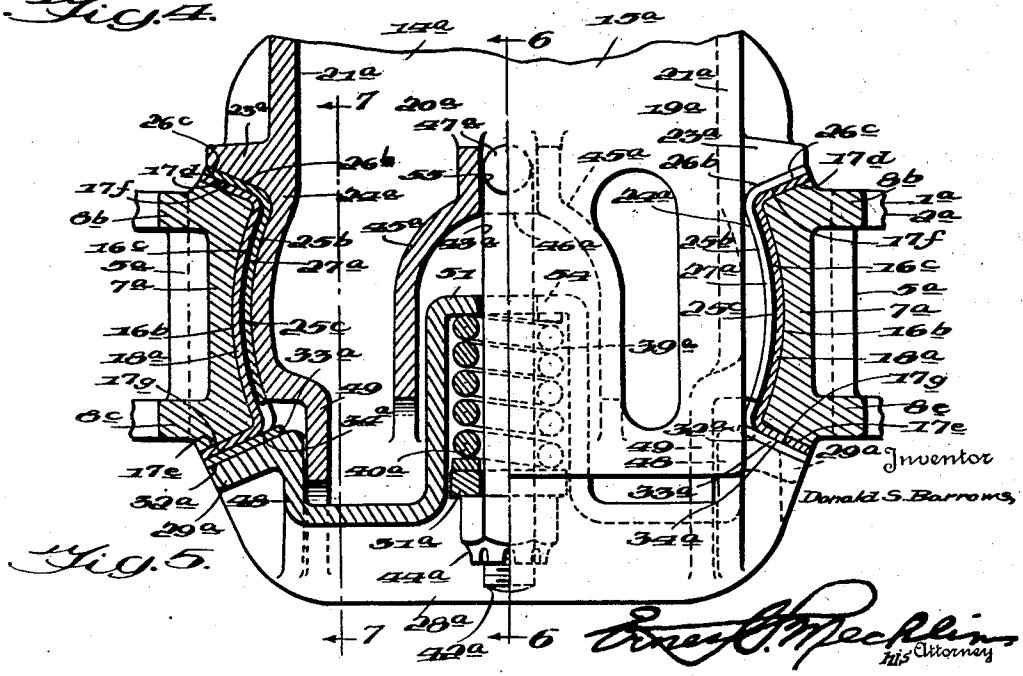


Fig. 5.

Inventor
Donald S. Barrows,
his Attorney

Sept. 16, 1941 D. S. BARROWS 2,255,960

RAILWAY TRUCK

Filed Sept. 15, 1938 4 Sheets-Sheet 4

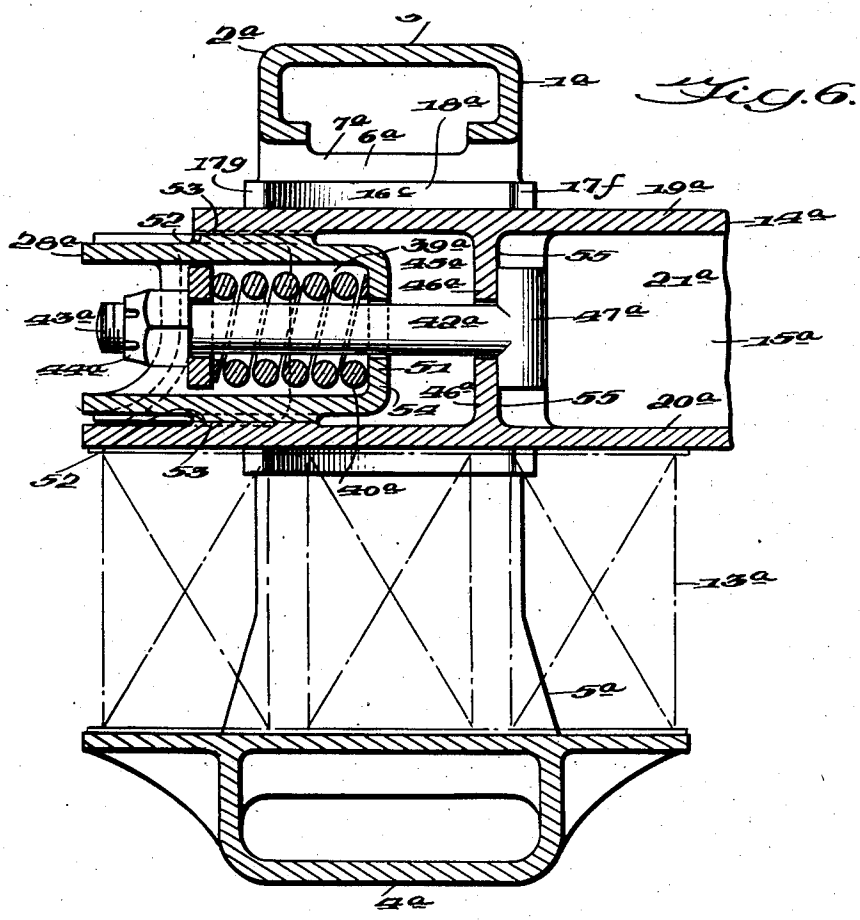
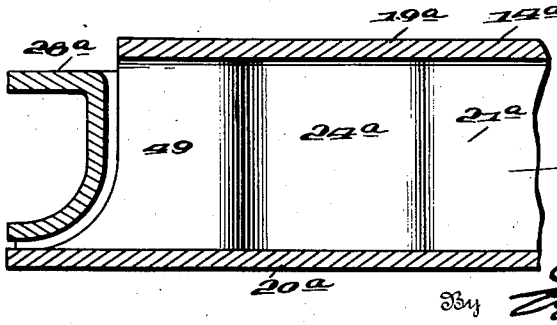


Fig. 6.

Fig. 7.



Inventor
Donald S. Barrows,
By Ernest G. Becklin,
his Attorney

Patented Sept. 16, 1941 2,255,960

UNITED STATES PATENT OFFICE

2,255,960

RAILWAY TRUCK

Donald S. Barrows, Rochester, N. Y., assignor to The Symington-Gould Corporation, Rochester, N. Y., a corporation of Maryland

Application September 15, 1938, Serial No. 230,085

30 Claims. (Cl. 105—197)

This invention relates to railway trucks and more particularly to the side frames, bolster and associated portions thereof.

An object of the present invention is to construct and arrange a truck bolster to be capable of pivoting or angling in a horizontal plane with respect to associated side frames within a predetermined degree so as to incorporate a desired amount of flexibility in the truck structure.

Another object of the invention is to include an arrangement of instrumentalities in a railway truck and particularly the bolster portion thereof so as to resiliently control the pivotal or angling movement of the bolster and thereby form means for returning a bolster to normal position after the bolster has deviated from a right-angle relationship with respect to associated side frames.

A further object of the invention is to provide, in a railway truck, a bolster structure capable of snubbing or dampening the vibrations or oscillations of the underlying bolster supporting springs during service.

A feature of the invention is to provide movable means having portions thereof extending outwardly of side walls of a bolster to engage column guides of an associated side frame.

Another feature of the invention is to provide means pivotally secured to a bolster structure and having portions thereof extending through suitable apertures in side walls of said bolster, said means having resilient means associated therewith so as to resist the movement thereof.

A more specific feature of the invention is to provide a bolster end portion with cylindrical surfaces to allow the bolster to pivot or angle in a horizontal plane with respect to an associated side frame, the cylindrical surfaces being defined adjacent one side by lugs formed integrally with the bolster and on the opposite side by a movable lever means, abutment elements disposed adjacent the end of the bolster, and spring means connected to the abutment elements and acting against the lever means so that the angling movement of the bolster will be resiliently controlled.

These objects and features as well as numerous others will become apparent by referring to the accompanying drawings which form a part of the present specification and which disclose exemplary forms of the invention.

By now considering the several figures in the drawings generally, it will be observed that:

Figure 1 is a partial side elevational view and a partial vertical sectional view of a railway truck embodying a form of the present invention.

Figure 2 is a horizontal sectional view taken along the lines 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a vertical sectional view taken along the lines 3—3 of Figure 2, looking in the direction of the arrows.

Figure 4 is a partial vertical elevational view and a partial vertical sectional view of a railway truck embodying a modification of the structure disclosed in Figures 1 to 3.

Figure 5 is a horizontal sectional view taken along the lines 5—5 of Figure 4, looking in the direction of the arrows.

Figure 6 is a transverse sectional view taken along the lines 6—6 of Figure 5, looking in the direction of the arrows.

Figure 7 is a sectional view taken along the lines 7—7 of Figure 5, looking in the direction of the arrows.

Referring now in detail to the drawings and particularly Figures 1 to 3 thereof, wherein like reference characters indicate like parts, the numeral 1 generally designates a railway truck which includes a pair of side frames 2 positioned transversely of the truck in spaced relation. While only one side frame is illustrated in the accompanying drawings, it will be understood that the railway truck includes two such side frames which are disposed longitudinally of the truck structure. The side frames each comprise a top chord or compression member 3 and a bottom chord or tension member 4 positioned in vertically spaced relation. The compression and tension members of each side frame are joined or connected intermediate their ends by longitudinally spaced vertically disposed column guides 5 to define a window or bolster opening 6 therebetween. Each column guide is desirably channel-shape in horizontal cross section and includes a transversely disposed web 7 terminating in laterally spaced longitudinally extending inner and outer flanges 8 and 8a, respectively, directed outwardly from the window opening toward the respective ends of the associated side frame. The tension member of each side frame is desirably box-shaped in vertical cross section and comprises an upper web 9 and a lower web 10 joined by laterally spaced vertically directed flanges 11 adjacent the transverse edges thereof. The upper web 9 is extended laterally of the side frame, as at 12, beyond the flanges 11 to form an adequate bearing area for a group or nest of superimposed bolster supporting springs 13 which are illustrated diagrammatically.

Extending between and pivotally connecting the side frames is a load carrying member or

bolster 14 arranged to move vertically with respect to the side frames and provided with end portions 15 thereof positioned in each window opening 6. The bolster ends are resiliently supported by means of the underlying springs 13.

In order to impart a desired degree of flexibility to the truck structure each bolster end and corresponding side frame are arranged and constructed so as to allow the bolster to pivot or angle in a horizontal plane with respect to the side frames and within a predetermined degree. In order to effect the above-recited pivotal bolster movement each column guide web is formed with an inwardly facing cylindrical concave surface 16 which is preferably struck from substantially the vertical axis of the corresponding side frame. The term "vertical axis" is herein employed to denote the intersection of the longitudinal vertical plane and transverse vertical plane of each side frame. By disposing the surfaces 16 on an arc struck from the vertical axis of the side frame the surfaces of each side frame will be substantially coaxial with respect to one another.

While it is desirable to provide for a pivotal or horizontal angling movement of the bolster with respect to the side frames, it is of equal importance that the recited movement of the bolster be limited to within a predetermined degree for, as will be understood, if the bolster is permitted to deviate from a true right-angle relationship with respect to the side frames beyond a certain degree, the component parts of the truck structure will assume, and possibly retain, a position entirely out of alignment with the inevitable result that the wheel flanges will override the rails and derailment will occur. So as to assist in limiting the pivotal or horizontal angling movement of the bolster, each concave surface 16 terminates in an inner and outer plane surface 17 and 17a on the inner and outer column guide flanges, respectively. The inner and outer flange surfaces of each column guide are disposed in a plane which, if extended, would substantially bisect the vertical axis of the associated side frame, thus presenting inner and outer flange surfaces which are substantially coradial with respect to one another. The column guides are provided with liners or wear plates 18, generally channel-shaped in horizontal cross section, which are secured thereto by means of welding or any other desirable method. Each wear plate 18 is fabricated to conform to the guide column concave surface 16 and radial surfaces 17 and 17a and, therefore, includes an inwardly facing concave cylindrical surface 16a which terminates in outwardly directed inner and outer plane substantially coradial surfaces 17b and 17c, respectively. It will, of course, be clearly understood that, if desired, the wear plates may be entirely dispensed with, and they are herein employed to extend the life of the side frames. By employing removable wear plates they may be readily replaced if, after being in service for a period of time and due to wear, the permissible clearance between the bolster and side frame engaging surfaces have been increased to an extent that the bolster deviates from a true right-angle relationship with respect to the side frames beyond a predetermined degree.

The bolster ends 15 each comprise a top or upper wall 19 and a vertically spaced bottom or lower wall 20 joined adjacent their transverse edges by vertically disposed side walls 21. The bottom wall 20 bearing against the underlying springs 13 may, if found desirable, be provided with integrally formed spring positioning means (not shown) so as to retain the upper extremities of the springs in their proper and respective relation as well as prevent the accidental displacement thereof during service. The top and bottom bolster walls are connected together intermediate the side walls by a centrally disposed reinforcing web 22 directed longitudinally of the bolster structure. Each bolster side wall is provided with a lug 23 formed integrally therewith and directed outwardly of the bolster structure in overlapping relation with the corresponding column guide. The lugs 23 are arranged inwardly of the side frames to form stops to limit the transverse movement of the bolster outwardly of the truck structure.

The bolster side wall portions adjacent the column guide webs are bulged, as at 24, to present outwardly facing cylindrical convex surfaces 25 preferably struck from the vertical axis of the corresponding side frame, and thus the surfaces of each end of the bolster structure are coaxial with respect to one another. One or the inner extremity of each convex surface 25 terminates in an outwardly facing surface 26 formed on the adjacent inner guide lug 23. The surfaces 26 are disposed in a plane substantially coradial with the vertical axis of the associated side frame. Each bolster end side wall is provided with a liner or wear plate 27 fabricated substantially L-shape to conform with the convex surface 25 and radial surface 26. The wear plates are removably secured to the bolster side walls by means of welding or any other desirable method and, like the wear plates 18 of the side frame, may be dispensed with as they are employed to extend the life or usefulness of the bolster. By its particular configuration each wear plate 27 is provided with an outwardly facing cylindrical convex surface 25a which is coaxial with the vertical axis of the associated side frame and juxtapositioned with respect to the corresponding concave cylindrical surface 16a on the column guide. This recited relation of cylindrical surfaces 25a and 16a not only provides for a pivotal connection between the bolster end and associated side frame but also presents bearing areas of appreciable dimension between the bolster and side frames. Each bolster plate convex surface terminates adjacent one or the inner extremity thereof in an outwardly facing surface 26a disposed in a plane coradial with the vertical axis of the associated side frame. The surface 26a of each wear plate is substantially co-extensive with and engages, throughout its entire area, the inner radial surface 17b of the side frame wear plate when the bolster is in normal position or right-angle relationship with respect to the side frames.

It will be observed that while the bolster and side frames are arranged so as to allow the former to deviate from a true right-angle relationship with respect to the latter, and thereby incorporate a desired degree of flexibility in the truck structure, there is no space or included angle between the radial surfaces 26a and 17b, and in this manner a surface bearing relation exists between the surfaces 26a and 17b when the bolster is in a normal position and no pivotal or horizontal angling movement thereof has taken place.

The present structure contemplates urging a displaced, pivoted or angled bolster back to normal or right-angle relationship with respect to the side frames, and to accomplish this purpose

the outer column guide engaging portions of the bolster structure are formed as movable means resiliently urged into intimate contact with the column guides of the side frames.

The movable means recited above includes a pair of oppositely disposed, interchangeable, counterpart levers 28 associated with each end of the bolster, each lever of a pair having an outer or guide lug portion 29 thereof extending longitudinally of the truck structure through an aperture 30 provided in each associated bolster side wall. Each aperture 30 is desirably positioned adjacent the outer extremity of the arcuate or bulged portion 24 and is defined longitudinally of the bolster by the bulged portion and a stanchion or post 31. As will be noted, the posts 31 form a continuation of the bolster side walls to connect the top and bottom walls of the bolster outwardly of the side frame and thereby rigidify that portion of the bolster. The posts 31 are spaced a distance outwardly from the lug portions 29 and thereby form abutments or means for limiting or arresting the movement of the lug portions longitudinally or outwardly of the bolster. The apertures 30 are desirably of sufficient dimension to allow a free unrestricted movement of the lever portions 29 inwardly and outwardly of the truck structure longitudinally of the bolster.

The portion 29 of the levers is of a vertical height substantially equal to the distance between the top and bottom walls of the bolster so that a vertical displacement of the levers, when the bolster moves vertically of the side frame during service, is prevented or restricted by the confining or closely associated upper and lower bolster walls. The guide lug portion 29 of each lever is provided with a surface 32 disposed in a plane substantially coradial with the vertical axis of the associated side frame.

Removably secured to the surface 32 by means of a weld (not shown) or any other method is a wear plate 33 having an inwardly facing surface 34 in intimate contact with the column wear plate outer surface 17c which disposes the surface 34 in a plane coradial with the vertical axis of the associated side frame.

The reinforcing web 22, positioned in each bolster end, terminates adjacent the vertical axis of the associated side frame in arcuate wings 35 to form a cup-shaped or open bearing or support 36 having an outwardly facing cylindrically formed concave surface 37 substantially coaxial with the vertical axis of the associated side frame. The levers 28 associated with each bolster end are formed with vertically spaced inner end arms 38 of cylindrical form and bearing against the concave surface 37 of the support 36. The arms 38 of each pair of levers are arranged in staggered or interlocked relation, thereby providing spaced bearing portions for the inner extremity of the levers to impart stability to the levers as well as to make them interchangeable, the latter of which reduces the cost of manufacture and simplifies the structure. It will be observed that each lever is pivotally mounted or connected to the bolster structure intermediate the side walls thereof and, therefore, capable of pivotal movement about the vertical axis of the associated side frame inwardly and outwardly of the truck structure. In this manner, upon any deviation of the bolster from a normal or right-angle relationship with respect to the side frames, the levers will pivot about the vertical axis of the side frames, having their surfaces 34 thereof continually in surface bearing relation with the column guide wear plate surfaces 17c, while the wear plate surfaces 26a will tend to move away from and assume an angular relation with their associated column guide wear plate surfaces 17b. This relationship between the respective surfaces will be clearly understood by pointing out that when the bolster deviates from its normal position the side frame on one side of the truck structure is leading or in advance of the other side frame. Consequently the transverse distance between the vertical axes of the side frames has been increased. It will be noted that only by reason of the movably connected levers 28 forming the outer guide lugs of the bolster structure may the radial surfaces 26a and 17b be in surface bearing relation when the bolster is in its normal position and still incorporate a desired degree of flexibility in the truck structure.

In order to retain each lever in a predetermined position there is associated therewith a resilient means removably connected to the bolster structure. To accommodate these elements each lever is provided with an outwardly facing apertured receptacle or pocket 39 positioned intermediate the ends thereof. Disposed in each lever pocket and having one or an inner end thereof bearing against the lever is a resilient element 40, preferably a coil or helical spring, having the axis thereof disposed parallel to a transverse vertical plane of the truck structure. Each spring 40 has an apertured washer or cap 41 associated with the other or outer extremity thereof. Threaded through each pocket and cap aperture and associated or interposed spring is a tie means or bolt 42 which may be of conventional form but which desirably includes a stem 43 having a removable element or nut 44 associated with the outer extremity thereof and in bearing relation with the associated spring cap. The nuts facilitate compressing the helical springs and form a means for maintaining the springs under a predetermined compression.

Spaced on either side of each intermediate bolster web 22 and positioned immediately inwardly of the longitudinal vertical plane of the associated side frame is a plurality of spaced columns 45 preferably connecting and formed integrally with the upper and lower walls of the bolster to form reinforcements for rigidifying the bolster ends. The columns are provided with upwardly directed hook-shaped projections 46 which are employed as bearings for a cross or T-shaped head 47 formed on the inner extremity of the bolt stems 43. It will be noted that the helical springs are arranged to react against the levers to urge them into intimate contact with the supports 36 and column radial surfaces 17c for resiliently controlling the pivoting or horizontal angling movement of the bolster.

It will also be noted that in addition to resiliently controlling the angling movement of the bolster the levers and associated springs function as means for creating frictional forces in order to dampen or cushion the harmonic or synchronous vibrations or oscillations of the underlying bolster supporting springs which may be created therein by reason of the truck structure passing over rail joints or irregularities in the supporting rails at regular periodic intervals. These frictional forces above referred to are created on the radial surfaces 17b and 17c of each column guide and associated radial surfaces 26a and 34, respectively, when the bolster is dis-

placed in a vertical direction from its normal position.

By now considering the second exemplification of the invention illustrated by Figures 4 to 7, inclusive, there is disclosed a railway truck indicated generally by the numeral 1ª. The railway truck includes, as a portion thereof, a pair of laterally spaced side frames 2ª only one of which is partially illustrated, it being clearly understood that each beam or side frame member is disposed longitudinally of the truck structure at each side thereof.

Each side frame comprises a top chord or compression member 3ª spaced above a bottom chord or tension member 4ª. The compression and tension members are connected intermediate their ends by longitudinally spaced, vertically disposed, column guides 5ª which define a window or bolster opening 6ª therebetween. Forming each column guide is a transverse web 7ª having inner and outer flanges 8ᵇ and 8ᶜ, respectively, directed outwardly or away from the window opening 6ª toward the associated ends of the side frame, thereby presenting column guides of channel configuration in horizontal cross section.

The present truck structure embodiment is preferably of the spring plankless type wherein the load-carrying member or truck bolster 14ª forms substantially the sole intermediate tie or connection between the side frames. It may at times be found desirable to employ a bottom connection between the side frames such as disclosed, described and claimed in Patent No. 2,066,609, granted January 5, 1937, to Joseph A. Cameron, and for this reason it is not the present intention to limit the instant invention to the particularly illustrated association of elements. The load-carrying member or bolster is arranged to move vertically with respect to the associated side frame and is provided with end portions 15ª extending into and occupying the upper area of the window openings 6ª. Each bolster end 15ª is superimposed upon and resiliently supported by means of a group or nest of springs 13ª which is illustrated diagrammatically and may be of any character.

The bolster 14ª and the associated portions of the side frame are designed and constructed to provide, within certain predetermined limits, a pivotal or horizontal angling movement of the bolster with respect to the side frames to thereby incorporate a desired degree of flexibility in the truck structure without sacrificing or materially diminishing the surface bearing relation between the engaging portions of the side frames and bolster. To accomplish this purpose each column guide web has an inwardly facing concave surface 16ᵇ having an axis substantially coinciding with the intersection of the vertical transverse and vertical longitudinal planes of the associated side frame, which will be hereinafter referred to as the vertical axis of the side frame. Each concave surface 16ᵇ terminates in plane diverging surfaces 17ᵈ and 17ᵉ positioned on the inner and outer column flanges 8ᵇ and 8ᶜ, respectively.

The column surfaces 17ᵈ and 17ᵉ desirably lie in planes which are substantially coradial with the vertical axis of the respective side frames, and in this manner all of the radial surfaces of each side frame are substantially coradial with respect to one another. In order to extend the service life of each side frame the column guides are provided with wear plates or liners 18ª fabricated channel-shape to conform to the inner contour of the column guides. By reason of its particular configuration each wear plate includes an inwardly facing concave cylindrical surface 16ᶜ which is substantially coaxial with the vertical axis of the associated side frame and radiating inner and outer plane surfaces 17ᶠ and 17ᵍ, respecetively, which lie in planes substantially coradial with the vertical axis of the associated side frame. Each side frame, therefore, is provided with substantially coaxial concave surfaces 16ᶜ and substantially coradial surfaces 17ᶠ and 17ᵍ. The liners or wear plates, which may if found desirable be entirely dispensed with, are removably secured to the column guides by means of welding (not shown) or any other method, and in this manner may be easily replaced when they have worn beyond a permissible amount.

The bolster ends 15ª each comprise a horizontal top or upper wall 19ª spaced vertically from a horizontal bottom or lower wall 20ª both of which are integrally joined adjacent their transverse edges by vertically disposed longitudinally spaced side walls 21ª. Each bolster side wall is provided with an outwardly directed lug 23ª arranged in overlapping relation with and inwardly of the associated column guide to form means whereby the transverse movement of the bolster with respect to the side frames is arrested. The bolster side walls have portions thereof which are positioned within the window opening 6ª bulged as at 24ª to form outer cylindrical convex surfaces 25ᵇ preferably struck from the vertical axis of the associated side frame. The inner extremity of each convex surface is directed outwardly of the bolster to extend as a plane surface 26ᵇ on the associated bolster lug 23ª. The surfaces 26ᵇ lie in planes which substantially bisect the vertical axis of the corresponding side frame, and thus the surfaces 26ᵇ at each respective end of the bolster are substantially coradial with respect to one another.

In order to prolong the service life of the bolster the side walls are provided with removable liners or wear plates 27ª desirably L-shaped in horizontal cross section to conform with the contour of the convex surfaces 25ᵇ and plane surfaces 26ᵇ. The wear plates 27ª, like the wear plates 18ª, are removably secured in position by means of welding or any other method so that after an amount of wear has taken place therein they may be easily replaced. By its particular configuration, therefore, each wear plate has an outwardly facing cylindrical convex surface 25ᶜ juxtapositioned and formed substantially coaxial with the concave surface 16ᶜ of the associated column guide; sufficient clearance being provided therebetween to allow a free unrestricted vertical as well as pivotal movement of the bolster with respect to the side frames. The convex surface 25ᶜ of each bolster wear plate terminates in an outwardly facing plane surface 26ᶜ which normally abuts the inner radial surface 17ᶠ of the side frame wear plate and, therefore, is disposed in a plane which, if extended, would substantially intersect the vertical axis of the associated side frame. It will be observed that normally there is no space or included angle between the surfaces 26ᶜ and 17ᶠ, and for this reason a bearing relation of appreciable area exists between the surfaces when the bolster is perpendicularly disposed with respect to the side frames and the side frames are in transverse alignment. In the present structure it is only when one side frame of the truck structure

assumes a position in advance of or out of transverse alignment with the other or corresponding side frame and the bolster has angled in a horizontal plane with respect to the side frames that the surfaces 26c and 17f assume an abnormal or angular relation with respect to one another.

While it will be noted from the preceding description that the bolster is free to pivot with respect to the side frames, provision has been made to restore a displaced bolster to normal position and the side frames in transverse alignment. To accomplish this purpose a movable means associated with each end of the bolster is arranged to constantly engage the corresponding side frame irrespective of the location or position of the side frames and bolster. The movable means, forming in part the outer column guide engaging portions of the bolster, comprises a lever member 28a which is positioned between the upper and lower walls of each bolster end. Each lever is generally of channel-shape in vertical cross section and extends across the bolster to form, in effect, a beam and closing piece. The levers have adjacent each end thereof an inwardly directed portion 48 which terminates in an outwardly and angularly disposed lug portion 29a, the latter of which has a plane surface 32a substantially coradial with the vertical axis of the associated side frame. The portions 29a, forming the outer guide lugs of the bolster, are provided with removable wear plates 33a which are secured thereto by means of welding (not shown) or any desirable method. The wear plates have inwardly facing plane surfaces 34a in bearing relation and substantially coaxial with the outer radial surfaces 17e of the associated column wear plates.

It will be noted by referring to Figures 5 and 7 that the side walls 21a are indented or offset inwardly of the bolster, as indicated by the reference numeral 49, to accommodate the portions 48 of the levers and continue toward the respective ends of the bolster to form stanchions, posts or supports 21a extending between the upper and lower bolster walls to rigidify the corresponding end portion 15a of the bolster. The indented portions 49 of the bolster are desirably positioned in spaced relation to the portions 48 of the levers, thereby affording a relatively free movement of the lever with respect to the bolster.

Spaced on either side of the longitudinal vertical plane of the bolster and positioned adjacent each end of the bolster is a column 45a preferably connecting and formed integrally with the upper and lower bolster walls to reinforce the bolster ends 15a intermediate the lateral edges thereof. The columns 45a are connected adjacent their inner extremities by vertically spaced web 46a.

Each lever has intermediate the ends thereof an inwardly directed housing or receptacle 51 which extends between and overlaps the front extremity of the columns 45a. A side frame of a railway truck has, during service, a tendency to rock or seesaw, that is to say, the ends of the side frame, as the truck traverses the rails, move in a vertical direction relatively to one another. This movement of the side frames is due to the wheels passing over irregularities in the rails and rail joints. In order to compensate for this rocking side frame motion and maintain a constant surface bearing relation between the lever surfaces 34a and the column guide surfaces 17e the levers are desirably pivotally supported intermediate their ends by the bolster, thereby permitting the levers to maintain a constant relation with respect to the side frame irrespective of the rocking motion set up in the side frames.

In accordance with the above, the top and bottom walls of the housing 51 are arcuately formed to present outer cylindrical convex surfaces 52 which bear directly against inwardly facing arcuate or cylindrical concave surfaces 53 formed on the upper and lower walls of the bolster. Due to the slight clearance between the bolster convex surfaces 25c and the side frame concave surfaces 16c the axes of the concave bolster surfaces 53 are slightly removed from and spaced on either side of the axis of the lever convex surfaces 52 which permits a slight horizontal movement of the levers with respect to the bolster ends. The housing 51 of each lever forms an outwardly opening pocket 39a for the reception of a resilient means 40a preferably in the form of a helical or coil spring which has the inner extremity thereof bearing against an apertured end or inner closing wall 54 of the housing.

Associated with the other or outer extremity of each spring is an apertured cap 31a. A bolt 42a having a stem portion 43a, extending longitudinally of the bolster and threaded through the end wall aperture, spring and spring cap aperture, has a movable element or nut 44a threaded on the outer or free extremity thereof; the nut bearing against the spring cap and forming a means for assisting in maintaining the spring under a predetermined compression.

While the bolt 42a may be of conventional design, the inner extremity thereof is preferably provided with a vertically disposed cylindrical cross head 47a which bears against cylindrical concave surfaces 55 formed on the vertically spaced webs 46a. In this manner the bolt is free to pivot in a horizontal plane when the bolster moves longitudinally of the truck structure with respect to the levers and side frames.

It will be observed that this structure, while capable of resiliently controlling the horizontal angling movement of the bolster with respect to the side frames, is also arranged to create frictional forces acting upon the side frame surfaces 17f and 17g, bolster surfaces 26c and lever surfaces 34a, to thereby dampen the harmonic vibrations of the bolster supporting springs which are or may be set up therein during service.

It will be clearly understood that the drawings illustrate and the specification describes merely exemplified forms of the present invention and that numerous changes and alterations may be made thereto without departing from within the spirit and scope of the appended claims.

I claim:

1. In a railway truck having a side frame which includes spaced column guides to form a window opening therebetween and provided with concave cylindrical surfaces terminating in coradial inner and outer surfaces, the combination of a bolster end positioned in said window opening having cylindrical convex surfaces on side walls thereof coaxial with said concave surfaces so as to allow the bolster to angle horizontally with respect to the side frame, inner guide lugs integral with said bolster having a radial surface substantially coextensive and normally in bearing relation with said column guide inner surfaces, outer guide lugs pivotally connected to said bolster and having radial surfaces in intimate contact with said outer column guide sur-

faces, said outer guide lugs being resiliently urged against said column guides to thereby control the angling movement of the bolster.

2. In a railway truck having a side frame including spaced column guides to form a window opening therebetween and provided with radial inner and outer surfaces, the combination of a bolster end positioned in said window opening and being arranged and constructed to angle horizontally with respect to the side frame, said bolster end having integral inner guide lugs provvided with surfaces which are normally in surface bearing relation with said column guide inner surfaces, outer guide lugs pivotally connected to said bolster and having surfaces in intimate contact with said column guide outer surfaces, and resilient means associated with said outer guide lugs for urging them against said column guides to thereby control the angling movement of the bolster.

3. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetween and a bolster end positioned in said opening arranged to angle horizontally with respect to the side frame, the combination of inner guide lugs formed integral with said bolster and adapted to bear against said column guides, outer guide lugs movably connected to and outstanding from said bolster, and resilient means associated with said outer guide lugs for urging them against said column guides to thereby control the angling movement of the bolster.

4. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetween and a bolster end positioned in said opening, the combination of wear plates removably secured to said column guides and having a cylindrical concave surface substantially coaxial with the vertical axis of said side frame, inner and outer radial surfaces on said wear plates substantially coradial with the vertical axis of said side frame, wear plates removably secured to said bolster and having cylindrical convex surfaces substantially coaxial with said concave surfaces and radial surfaces normally bearing against said inner radial surfaces, levers pivotally connected to said bolster each having a portion thereof extending outwardly of said bolster, a wear plate removably secured to said outwardly extending portion and in intimate contact with one of said outer radial surfaces, and resilient means urging said levers inwardly of the truck structure.

5. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetween and a bolster end portion positioned in said opening being spring-supported from said side frame, the combination of outer lugs movably connected to said bolster, horizontally disposed resilient means removably connected to said lugs for urging them inwardly of the truck structure into surface bearing relation with said column guides to thereby dampen the oscillations of the bolster supporting springs.

6. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetween and a bolster end portion positioned in said opening being spring-supported from said side frame, the combination of levers movably connected to the bolster intermediate side walls thereof and having guide lug portions extending outwardly through apertures in said side walls to overlie said column guides, spring means associated with said levers inwardly of said bolster side walls for urging said guide lug portions into bearing relation with said column guides to thereby dampen the oscillations of the bolster supporting springs.

7. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetweeen and a bolster end positioned in said opening arranged to angle horizontally with respect to the side frame, the combination of lever means positioned within said bolster end and having one end thereof cylindrically formed and bearing against a correspondingly formed portion of the bolster, guide lug portions forming the other end of said lever means and extending through apertures in side walls of said bolster to overlie the column guides, and spring means acting against said lever means intermediate the ends thereof for urging said guide lug portions against said column guides to thereby control the angling movement of said bolster.

8. A bolster including column guide cooperating portions, said portions being pivotally connected to the bolster within the confines thereof and movable about a vertical axis, and separate means for maintaining said portions in column guide cooperating position.

9. A bolster having column guide cooperating portions exteending outwardly of side walls thereof, some of said portions being formed integrally with said side walls, and the other of said portions extending through apertures in said side walls, said other portions having resilient means associated therewith to urge them toward the first-named portions.

10. A bolster including inner and outer column guide cooperating portions on each side thereof, said inner portions being formed integrally with the bolster and said outer portions being adapted to be resiliently urged longitudinally of said bolster toward the integral portions; said outer portions having vertically disposed surfaces within the vertical limits of said bolster and adapted to bear against correspondingly disposed column guide surfaces.

11. In a bolster having cylindrical surfaces formed on side walls thereof adapted to engage correspondingly formed surfaces on the webs of associated column guides to allow the bolster to angle horizontally with respect to an associated side frame, the combination of column guide engaging portions removably associated with said bolster, and means adapted to urge said portions into engagement with said column guides for controlling the angling movement of the bolster.

12. In a bolster having substantially coaxial cylindrical surfaces formed on side walls thereof adapted to engage correspondingly formed surfaces on webs of associated column guides to allow the bolster to angle horizontally with respect to an associated side frame, the combination of column guide engaging portions pivotally connected to said bolster intermediate said side walls and resilient means adapted to urge said portions into engagement with said column guides for controlling the angling movement of the bolster.

13. In a bolster having cylindrical convex surfaces formed on side walls thereof adapted to engage correspondingly formed surfaces on column guides of an associated side frame to allow the bolster to angle horizontally with respect to said side frame, the combination of column guide engaging portions movably secured to said bolster, said portions extending through apertures in

said side walls, means adapted to urge said portions into engagement with said column guides for controlling the angling movement of the bolster, said portions having surfaces thereof substantially coradial with the vertical axis of said side frame.

14. A bolster having inner and outer column guide cooperating portions on each side thereof, some of said portions being formed integrally with said bolster and the other of said portions being movably connected to said bolster, spring means associated with the other of said portions; the axes of said spring means being disposed in parallel relation to the longitudinal axis of said bolster.

15. In a bolster constructed and arranged to angle horizontally with respect to an associated side frame within a predetermined degree, the combination of means movably connected to said bolster between upper and lower walls of an extremity thereof and adapted to engage a portion of said side frame, and spring means acting longitudinally of said bolster and associated with said means for resiliently resisting the angling movement of said bolster.

16. In a bolster having convex cylindrical surfaces adjacent each end thereof to allow the bolster to angle horizontally with respect to associated side frames and integral lugs outstanding from adjacent each end of the bolster having plane surfaces substantially coradial with the vertical axis of said associated side frames, the combination of levers pivotally connected to said bolster adjacent each end thereof substantially on the vertical axis of the associated side frame, said levers each including a portion extending through an aperture in side walls of said bolster, surfaces on said levers substantially coradial with said lug surfaces, means associated with said bolster adjacent each end thereof, and spring means connected to said means and reacting against said levers for controlling the angling movement of said bolster.

17. In a bolster having convex cylindrical surfaces adjacent each end thereof to allow the bolster to angle horizontally with respect to associated side frames, the combination of means pivotally connected to said bolster adjacent each end thereof and extending through apertures in side walls of said bolster, the portion of each means outwardly of the bolster side walls including plane surfaces substantially coradial with the vertical axis of each associated side frame, and spring means arranged to react against said means for controlling the angling movement of said bolster.

18. In a bolster having convex cylindrical surfaces adjacent each end thereof to allow the bolster to angle horizontally with respect to associated side frames, the combination of means connected to said bolster intermediate side walls thereof and having portions extending through apertures in said side walls, the portion of each means outwardly of said side walls including a plane surface substantially coaxial with the vertical axis of each associated side frame, spring means arranged to react against said means for controlling the angling movement of said bolster, and stop means normally spaced from each means to limit the movement of said means.

19. In a bolster having arcuate portions formed on side walls thereof to form column guide engaging portions and allow the bolster to angle horizontally with respect to an associated side frame, the combination of column means spaced from said arcuate portions connecting top and bottom walls of said bolster, lever means extending outwardly of said side walls between said arcuate portions and column means, and resilient means reacting against said lever means, said lever means being adapted to engage column guides of said side frame for controlling the angling movement of said bolster.

20. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therein and a bolster end positioned in said opening arranged to angle horizontally with respect to the side frame, the combination of lever means positioned within said bolster end, said lever means having end lug forming portions bearing against said column guides, a housing formed in said lever means intermediate the ends thereof, cylindrical convex surfaces on said housing in bearing relation with vertically spaced concave surfaces on said bolster whereby the lever means may assume an angular relationship with respect to the bolster, spring means within said housing for retaining said lug forming portions against said column guides, and means associated with said bolster for maintaining said spring means under compression.

21. A bolster having column guide cooperating portions presenting vertically disposed column guide engaging surfaces, said portions being pivotally connected to the bolster and adapted to be resiliently urged toward associated column guides.

22. A bolster having inner and outer column guide cooperating portions, some of said portions being formed integrally with side walls of said bolster and the other of said portions being extended through apertures in said side walls, said other portions being pivotally secured to said bolster and having means associated therewith to urge them toward the first-named portions.

23. In a bolster having coaxial cylindrical surfaces formed on side walls thereof adapted to engage correspondingly formed surfaces on column guides of an associated side frame to allow the bolster to angle horizontally with respect to said side frame, and said bolster side walls having integral lugs for engagement with said column guides, the combination of column guide engaging portions movably connected to said bolster, said portions extending through apertures in said side walls, and means adapted to urge said portions into engagement with said column guides for controlling the angling movement of the bolster; said portions having surfaces thereof substantially coradial with respect to one another.

24. In a railway truck having a side frame which includes spaced column guides to form a bolster opening therebetween and a bolster end positioned in said opening, the combination of wear plates removably secured to said column guides and having a cylindrical concave surface substantially coaxial with a vertical axis of said side frame, inner and outer radial surfaces on said wear plates substantially coradial with said vertical axis, and wear plates associated with said bolster presenting convex surfaces adapted to engage said concave surfaces and radial surfaces adapted to engage said inner and outer radial surfaces said bolster wear plates being movable relative to one another.

25. In a bolster, in combination, longitudinally spaced side walls, inner guide lugs formed integrally with said side walls, outer guide lugs mov-

able relatively to said bolster, means urging said outer guide lugs toward said inner guide lugs, and wear plates secured to said side walls and lugs.

26. In a railway truck involving a side frame having spaced column guides to form a bolster opening therein and a bolster end positioned in said opening, the combination of lever means positioned within said bolster end and having end portions engaging said column guides, interlocking cylindrical portions formed on said lever means bearing against a correspondingly formed portion of said bolster, housings formed in said lever means between said column guide engaging portions and cylindrical portions, spring means positioned in said housings, and means associated with said spring means and bolster for maintaining said spring means under compression.

27. In a railway truck, in combination, a side frame having spaced column guides defining an opening therebetween, a bolster having an end portion positioned within said opening, resilient means supporting said bolster from said side frame, lugs formed on said bolster in bearing relation with said column guides, and movable lugs spaced from said first-named lugs and outstanding from said bolster; said movable lugs being within the horizontal plane of said bolster end portion and having means associated therewith to retain them in bearing relation with said column guides.

28. In a bolster having an end portion formed by vertically spaced top and bottom walls joined by horizontally spaced side walls, lugs outstanding from said side walls adapted to engage column guides of a side frame, the combination of means forming a closing piece for said bolster end having portions extending beyond the side walls in spaced relation to said lugs and adapted to engage said column guides, said means intermediate its ends being movably connected to said bolster, and arcuate surfaces on said means in engagement with arcuate surfaces on said top and bottom walls, whereby the means may assume an angular relation with respect to said bolster.

29. In a railway truck having a side frame which includes spaced column guides to form a bolster therein and a bolster end positioned in said opening arranged to angle horizontally with respect to the side frame, the combination of lever means positioned within said bolster end having end lug forming portions adapted to engage said column guides, a housing formed in said lever means intermediate the ends thereof, spring means within said housing, and means associated with said bolster for maintaining said spring means under compression.

30. A bolster having an end portion formed by vertically spaced top and bottom walls joined by horizontally spaced side walls, lugs formed on said side walls for engagement with column guides of a side frame, and movable guide lugs associated with said bolster in spaced relation to said first-named lugs and adapted to engage said column guides; said side walls being offset inwardly of said bolster to accommodate said movable guide lugs.

DONALD S. BARROWS.