Aug. 14, 1951 W. H. BASELT 2,564,091

TRUCK

Filed Jan. 10, 1945 3 Sheets-Sheet 1

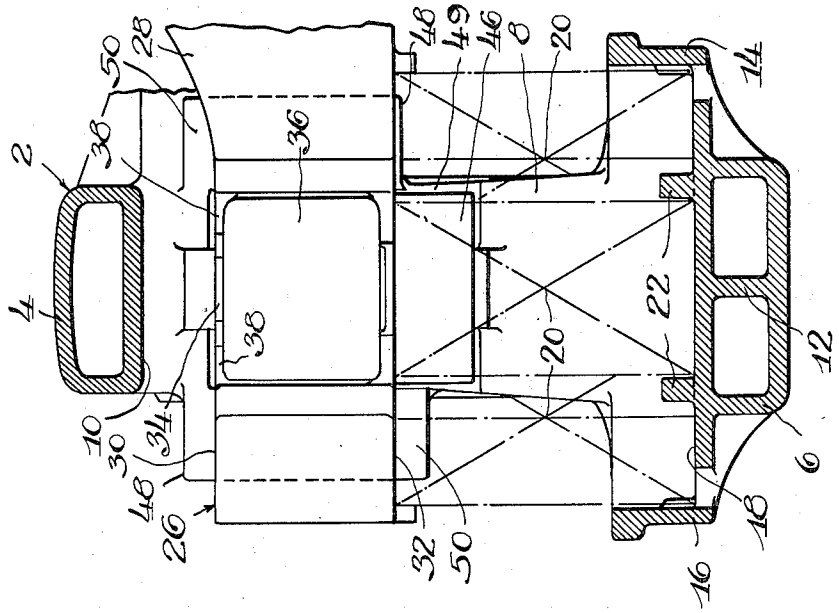


Fig. 2

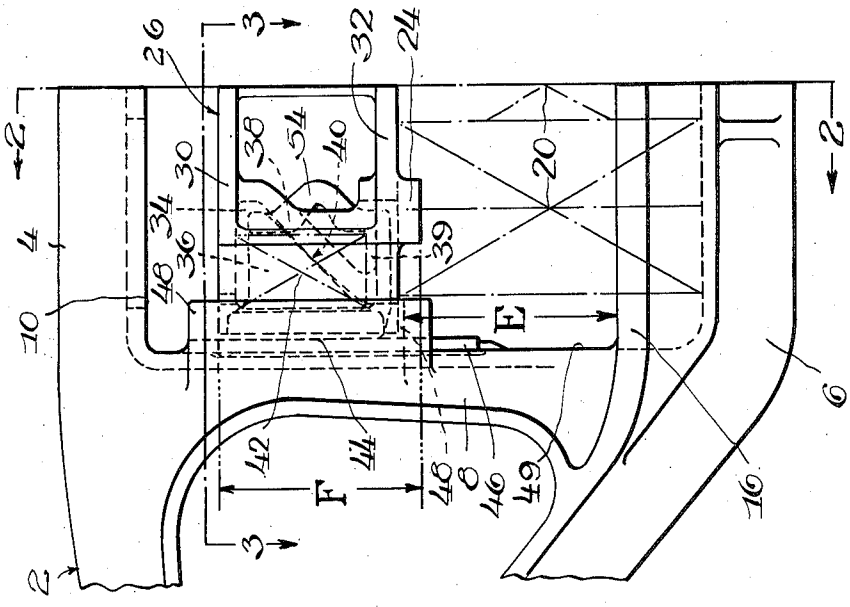


Fig. 1

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TRUCK

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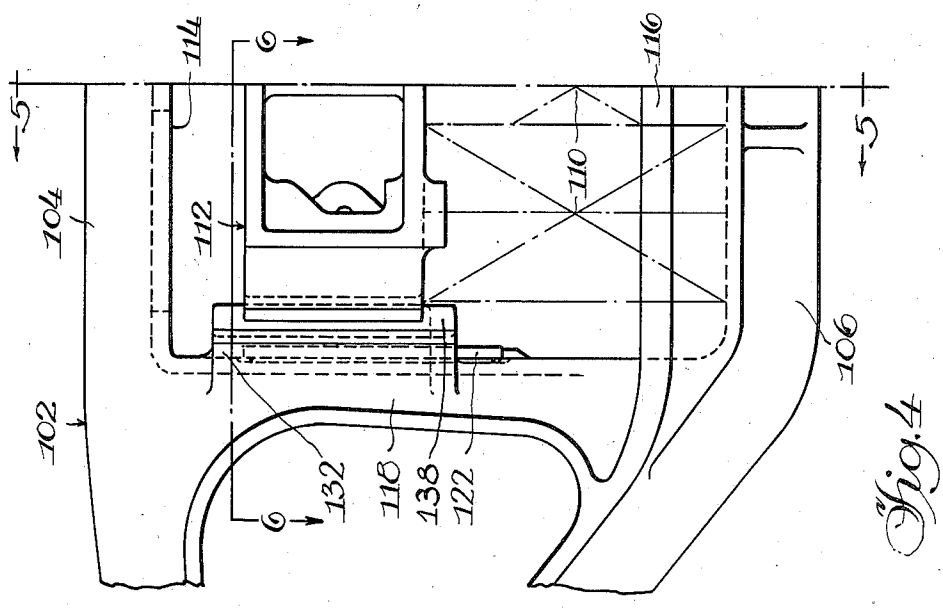


Fig. 4

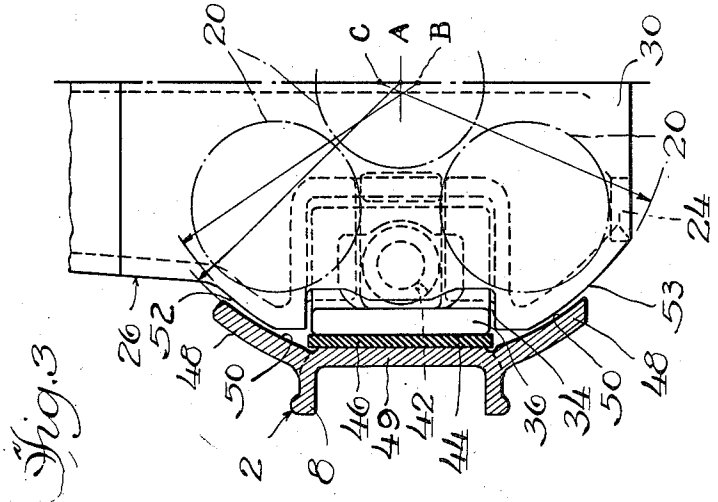


Fig. 3

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TRUCK

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Fig. 6

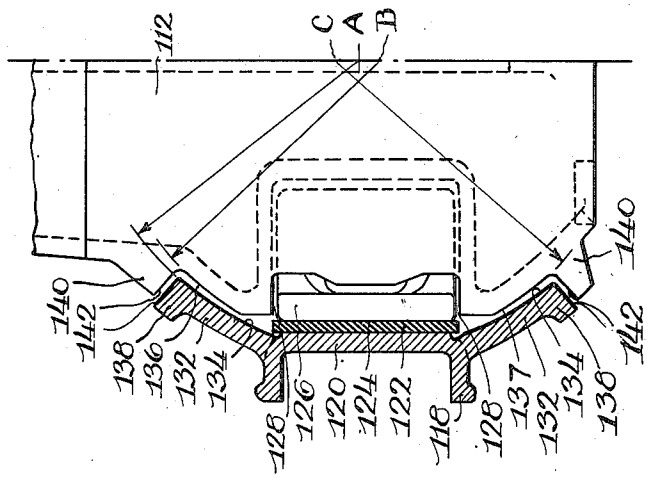
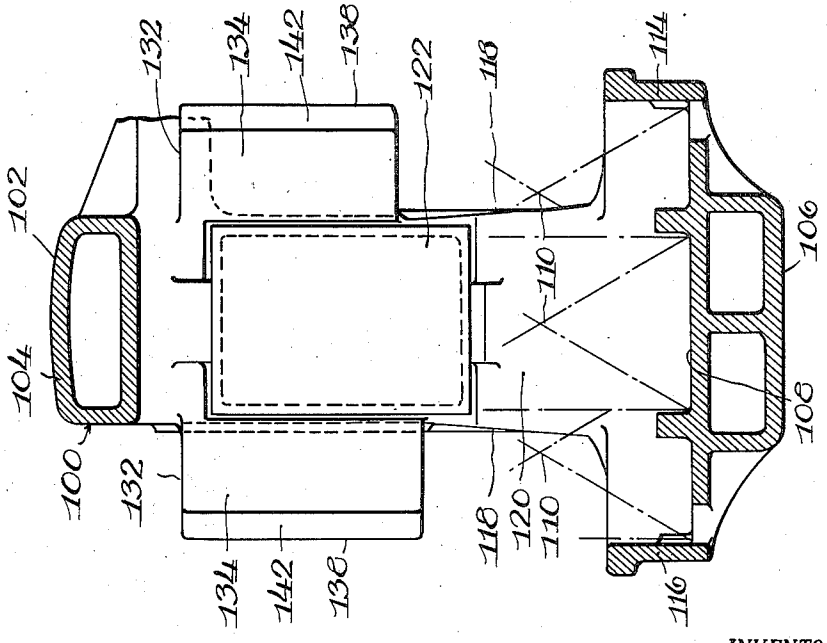


Fig. 5



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UNITED STATES PATENT OFFICE

2,564,091

TRUCK

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Application January 10, 1945, Serial No. 572,171

34 Claims. (Cl. 105—197)

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My invention relates to railway car trucks and more particularly to a freight car truck having a snubbing device associated with each bolster end and guide columns on the side frames by which frictional control is afforded of the oscillations of the bolster-supporting coil spring group.

It is well known that at the present time freight cars utilizing trucks of the type described are used in fast freight service in which speeds up to eighty miles per hour or more are often realized. In such trucks, the snubbing device associated with each side frame column and the bolster usually comprises friction shoes supported in the bolster and actuated into frictional engagement with friction surfaces on the side frame columns by associated friction means for snubbing the oscillations of the bolster-supporting spring group. In service, it is desirable to limit the lateral movement of the bolster, as well as horizontal angling of the same, and in various types of such truck, such movement is also controlled by the engagement of the shoes of the bolster with the friction surfaces on the columns. While the device may initially function satisfactorily for accomplishing this purpose, the parts composing the device may become worn in service with the result that the restriction by the device upon the aforementioned bolster movement is impaired.

It is the general object of my invention to provide in a freight car truck of the type described a novel bolster and side frame construction whereby longitudinal and lateral movement of the bolster, as well as horizontal angling of the bolster relative to the side frames is effectively restricted to an allowable predetermined degree by the side frame columns independently of the snubbing device.

Another object of my invention is to provide in a truck of the type described side frames and columns for engagement with friction shoes housed in an associated bolster, said bolster and columns being in such spaced relationship as to accommodate the before-mentioned bolster movements while restricting movements of the shoes along any engaged surfaces of the bolster to a minimum during lateral movement of the bolster, whereby wear on the shoes and the portions of the bolster in engagement therewith is substantially reduced.

Another object of my invention is to provide a novel bolster and side frame column construction for a truck of the type described having associated coacting cylindrical surfaces permitting the bolster and side frame to rotate or angle horizontally relative to each other through a predetermined degree with the further provision of other surfaces engageable to limit the said horizontal angling movement of said bolster.

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A further object of my invention is to provide a novel interlocking arrangement between the side frames and the bolster in a railway car truck of the type described for maintaining the same in assembled relationship and permitting the ready assembly and disassembly of the bolster from the side frames for quick wheel change purposes.

My novel bolster and side frame construction is shown and described in a quick wheel change car truck comprising side frames of truss type having inboard and outboard confining flanges on the tension member for the bolster-supporting springs. This arrangement for confining the springs has proven highly satisfactory under service conditions and in order to permit the utilization of this beneficial feature in a quick wheel change truck, the guide webs of my novel side frame are formed to permit the insertion of a bolster therein for interlocking the bolster with the side frames without interference with the confining flanges.

In the drawings, Figure 1 is a fragmentary side elevation of a truck embodying my invention, only one-half of the truck being shown inasmuch as the other half is similarly arranged.

Figure 2 is a transverse sectional view through the truck shown in Figure 1 with a portion of the bolster shown in elevation, the section being taken substantially in the vertical plane bisecting the truck transversely as indicated by the line 2—2 of Figure 1.

Figure 3 is a top plan view of the truck shown in Figures 1 and 2, partly in section, the section being taken substantially in the horizontal plane indicated by the line 3—3 of Figure 1.

Figures 4, 5 and 6 illustrate another modification of my invention. Figure 4 being a fragmentary side elevation, Figure 5 a fragmentary transverse sectional view with the section taken in the vertical plane indicated by the line 5—5 of Figure 4 with the bolster omitted, and Figure 6 being a fragmentary top plan view partly in section with the section taken approximately as indicated by the line 6—6 of Figure 4.

Referring to the drawings and initially considering the modification illustrated in Figures 1-3 inclusive, it will be noted that I have illustrated my invention as applied to a well known form of freight car truck utilizing a truss type

side frame generally designated 2 having the compression member 4, the tension member 6 and a column 8 merging with said tension and compression members adjacent each end of the frame to form the bolster opening 10.

The compression and tension members may be generally of box section (Figure 2) with the tension member beneath said bolster opening having the central longitudinal reinforcing web 12 and with the top wall widened and formed with upstanding inboard and outboard flanges 14 and 16 defining the spring seat 18 on which is positioned a spring group generally designated 20 and comprising a plurality of coil springs, said springs being retained in normal relationship not only by the confining flanges of the tension member, but also by the lugs 22, 22 on the spring seat 18 and the lugs 24, 24 downwardly projecting from the associated bolster, generally designated 26.

The bolster 26 is illustrated as a well known type and is of boxlike form comprising the side walls 28, the top wall 30 and the bottom wall 32, the said side walls of each bolster end adjacent said columns being of arcuate formation in top plan and having pockets 34, 34 adjacent respective columns 8, 8, and within said pockets may be housed friction shoes 36, 36, each shoe being so mounted in the confining pocket as to accommodate its sliding along the diagonal walls 38, 38, as indicated at 40, under impetus of the associated auxiliary spring diagrammatically illustrated at 42, seated at one end against the top wall 30 and at the other end on the horizontal wall 39 of the shoe, so that the outer wall or face of the shoe may have flat face frictional engagement as at 44 against the friction panel or wear plate 46 which may be secured on the adjacent column 8 in any convenient manner.

The above-described friction device is shown and described in greater detail in Patent No. 2,378,414, issued June 19, 1945, in the name of David M. Light for Car Truck and forms no part of the present invention.

The normal relative positions of the bolster and side frame under ideal operating conditions are approximately illustrated in Figures 1, 2 and 3, and it will be apparent that the flat face frictional engagement of each shoe with the wear plate on the adjacent column afforded by the pressure exerted on the shoes by the auxiliary springs 42 will tend to maintain the bolster in true perpendicular relation to the side frame. However, this relationship is not maintained in operation due to various track and other conditions which cause the car body to sway with resultant lateral and longitudinal movement of the bolster, as well as horizontal angling of the bolster, relative to the side frames. It will be readily apparent that such movement of the bolster, if only restricted by the shoes will not be limited to any great extent due to the tendency of the shoes in their engagement with the wear plates of the columns to slide thereupon during the longitudinal movement of the bolster and to reciprocate into and out of the bolster during lateral movement of the bolster. These longitudinal and lateral movements of the bolster may cause considerable wear of the shoes and the diagonal walls 38, 38 of the bolster in engagement with the shoes, as well as the wear plates.

Under such conditions, it is desirable to have other means, preferably independently of the snubbing device, for controlling the longitudinal and lateral movement of the bolster relative to

the side frames while permitting horizontal angling movement of the bolster with respect to the side frames to permit a desired degree of flexibility in the truck. For this purpose I have devised a novel bolster and column construction comprising the spaced inboard and outboard bolster guide webs 48, 48 on opposite sides of the transverse wall 49 of each column. The guide webs 48, 48 extend above and below the bolster as shown in Figures 1 and 2, and arcuately formed to provide inwardly facing cylindrical concave surfaces 50, 50 which are preferably struck from substantially the vertical axis of the corresponding side frame, the term "vertical axis" denoting the intersection of the longitudinal vertical plane and the transverse vertical plane of each side frame and being designated "A" in Figure 3, and, therefore, the surfaces of the column guide webs on each side frame may be considered coaxial with respect to one another. The bolster side walls, adjacent the column guide webs, are formed to present outwardly facing inboard and outboard cylindrically convex surfaces 52 and 53, respectively, on opposite sides of each pocket 34 in the same, said inboard surfaces 52 being preferably struck from a point in the transverse vertical plane of the corresponding side frame outboard the vertical axis thereof as indicated at B so that the same are coaxial with respect to one another. The outboard surfaces 53 are preferably struck from a point in the transverse vertical plane of the corresponding side frame inboard the vertical axis thereof as indicated at C a distance preferably equal to the distance between the vertical axis A of the side frame and the point B, the outboard surfaces 53 thus also being coaxial with respect to one another. Inasmuch as axis B is disposed outboardly of axis C and the surface 52 defined from B is inboardly of the surface 53 defined from C, the radii of curvature of each pair of surfaces 52 and 53 intersect intermediate their ends at a point between the longitudinal centerline of the bolster and the adjacent side thereof, said point being disposed in a vertical plane extending transversely of the bolster between the centers B and C from which said radii are drawn. The coacting concave surfaces 50, 50 and the convex surfaces 52 and 53 are preferably formed in this manner to primarily limit the lateral and longitudinal movement of the bolster while permitting horizontal angling of the bolster relative to the side frames without wedging engagement of the respective adjacent diagonally disposed surfaces. It may be noted that the clearance between the surfaces and the disposition of the same will allow the smooth sliding engagement of the surfaces even in the extreme angular position of the bolster irrespective of shifting of the axis of rotation of the bolster relative to the side frames. It will also be apparent that the longitudinal movement of the bolster relative to the side frames is effectively restricted by the engagement of either the cooperating outboard surfaces 53 in one direction of movement or the cooperating inboard surfaces 52 in the opposite direction of movement, while the lateral movement of the bolster relative to the side frames will be limited by the substantially flush engagement of the surfaces 52 and 53 on one side of the bolster with the surfaces 50 on the adjacent column webs 48 disposed in the path of movement of the bolster. The movements of the shoes will be reduced to a minimum due to the small clearance between the surfaces of the bolster and the column webs whereby wear on the

shoes and the diagonal walls of the bolster will be substantially reduced. It may be further noted that each of the surfaces 50, 50 of the webs 48, 48 will form an extensive bearing area for permitting horizontal angling of the bolster and also for guiding the bolster during vertical movement of the same.

An additional feature of the present invention is the provision of assembling or disassembling the car truck for effecting a quick wheel change, and for this purpose, referring now to Figures 1 and 2, the inboard guide webs 48 of the columns are spaced from the inboard flange 14 partially defining the spring seat 18, a distance indicated by E, which distance is greater than the overall depth of the bolster end indicated by F, so that in the assembly of the truck, the bolster end may be inserted and elevated in the bottom of the bolster opening with the shoes disposed opposite the wear plates on the adjacent columns, the shoes being held within the pockets in the bolster end by engagement of a suitable tool with the loop portion 54 of the shoes to afford sufficient clearance between the friction faces of the shoes and the columns of the side frames during this operation, whereupon the spring group may be positioned beneath the bolster end for supporting the same.

In the modification illustrated in Figures 4, 5 and 6, the before-mentioned purposes are accomplished in a somewhat similar manner except that the bolster ends and guide webs of the columns are provided with stop means for limiting horizontal angling of the bolster after a predetermined amount of such movement of the same relative to the side frames. In this modification, the parts are otherwise generally similar to those of the first modification, including the truss type side frame 102 with the compression member 104, the tension member 106 having the spring seat 108 for the supporting springs diagrammatically illustrated at 110 upon which the bolster end 112 may be seated in usual manner within the bolster opening 114, said spring seat 108 having the confining inboard and outboard flanges 114 and 116, and said bolster opening being defined by said tension and compression members and spaced columns 118, 118. On the transverse wall 120 of each column may be mounted a wear plate or friction panel 122 against which may seat as at 124 the friction shoe 126 received in the pocket 128 in the side wall of the bolster and for actuation by an auxiliary spring (not shown) as described in the previous modification.

As in the previous modification, each column 118 is provided with the spaced diagonally arranged webs 132 extending outwardly on opposite sides of the transverse wall 120 and above and below the bolster end 112, said webs having the cylindrically concave guide surfaces 134 substantially coaxial with the vertical axis A of the associated side frame, said surfaces coacting with the inboard and outboard convex surfaces 136 and 137 on the bolster end on opposite sides of each pocket 128 therein, the concentric inboard surfaces 136 being struck from a point B and the outboard surfaces 137 being struck from a point C in the transverse vertical plane of the corresponding side frame on opposite sides of the vertical axis A of the side frame as described in the previous modification.

In this modification it will be noted that the spaced inboard and outboard webs 132 of each column are provided at their ends with diagonally arranged projecting lugs 138, and the end of each guide surface 136 and 137 on the bolster end remote from the pocket 128 is provided with a lug 140, each of said lugs 138 and 140 having plane vertical surfaces 142 disposed in facewise relationship in planes substantially co-radial with the vertical axis of the associated side frame. With the radial surfaces on the side frame and bolster positioned as disclosed and described, it will be appreciated that the bolster may readily rotate or angle in a horizontal direction relative to the side frame through a predetermined arc and that in the extreme allowable angular position of the bolster there will be contact between the radial faces 142 diagonally opposite each other. In other words, the associated coacting surfaces at one side of the bolster inboard the side frame and at the other side of the bolster outboard the side frame will be brought into bearing relation upon an angular movement of the bolster extremity in either direction to thereby form a positive stop preventing further horizontal angling of the bolster relative to the side frame.

As in the previous modification, the car truck may be readily assembled and disassembled for quick wheel change purposes by spacing the inboard web 132 of the side frame columns from the inboard flange 114 of the tension member a distance greater than the over-all depth of the bolster end so that the bolster end may be inserted and elevated in the bottom of the bolster opening and the spring group positioned thereunder for supporting the same.

It will be apparent that, in both modifications, the engagement of the shoes with the associated diagonal surfaces of the respective bolster pockets and the engagement of the shoes with the associated column wear plates under the pressure afforded by the auxiliary springs will resiliently control the pivotal or angling movement of the bolster and will return the bolster to normal right-angle position with respect to the associated side frames.

In car trucks of the general type such as hereindescribed, certain operating conditions have been known to cause the bolster to leave the supporting springs and rise to the top of the bolster opening, that is, to a position wherein the spring-confining lugs on the bolster clear the upper ends of the fully expanded springs. This condition is frequently accompanied by or is the result of shocks imposed on the truck longitudinally thereof as when the cars are humped or are being coupled and usually these shocks are of such magnitude that the inboard and outboard bolster-supporting springs, which are disposed for the major part beyond the inboard and outboard sides of the columns, are caused to fall out of the bolster opening. These springs in falling out generally follow a path slightly diagonally to the plane of the side frame. The loss of springs has occurred particularly in trucks such as illustrated wherein the friction means are carried by the bolster. These friction means carried by the bolster retard the descent of the bolster onto the springs a sufficient length of time to permit the springs to fall out of the bolster opening as hereinbefore noted. In the truck structures herein disclosed, the column side webs 48 and 132, which, as heretofore mentioned, extend below the bolster in normal operating position and thus below the upper level of the springs, prevent the springs from tipping out of the bolster opening inasmuch as the side webs are partially aligned with the adjacent springs

in a direction longitudinally of the truck when the bolster is in normal operating position or at the upper end of the opening and thus obstruct the path of movement of the springs in attempting to fall out of position. In thus limiting the movement of the springs, that is, by abutment of the upper ends of the adjacent springs and webs, the webs cooperate with the spring-positioning flanges on the tension member spring seat in confining the springs in the bolster opening. It will be noted that the side webs are curved toward the spring group and thus extend partially around the inboard and outboard sides of the spring group and that the webs at points remote from the columns are brought closer to the spring group in order to prevent the springs from tipping as much as possible so that they may easily return to their upright positions.

It is to be understood that I do not wish to be limited by the exact embodiments of the device shown which are merely by way of illustration and not limitation as various and other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a railway car truck, spaced side frames each comprising tension and compression members and spaced columns defining a bolster opening, said tension member being of box section with the top chord of said box section widened and formed with inboard and outboard flanges defining a spring seat, each of said columns comprising a transverse wall and inboard and outboard bolster guide webs, a spring group on said seat, a bolster end supported on said group and having pockets at opposite sides thereof adjacent said walls, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, coaxial concave surfaces on said webs, convex surfaces on said bolster end at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, each of said webs having a face at the outer extremity thereof formed in a plane substantially radial from the vertical axis of the corresponding frame, lugs on said bolster end disposed adjacent the outer extremities of said webs, each lug having a face adapted to cooperate with the face on the adjacent web for limiting relative angling movement of said bolster with respect to each side frame, the distance between said inboard webs and said inboard flange being greater than the over-all depth of the bolster end whereby said bolster may be inserted and elevated in said bolster opening for slidably engaging said shoes with said columns.

2. In a railway car truck, a pair of side frames each comprising spaced columns partly defining a bolster opening, each of said columns comprising a transverse wall and inboard and outboard bolster guide webs, a bolster resiliently supported on said frames and having pockets at opposite sides thereof adjacent said column walls, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, coaxial concave surfaces on said webs, convex surfaces on said bolster at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, each of said webs having a face at the outer extremity thereof formed in a plane substantially radial from the vertical axis of the corresponding frame, lugs on said bolster disposed adjacent the outer extremities of said webs, each lug having a face adapted to cooperate with the face on the adjacent web for limiting relative angling movement of said bolster with respect to each side frame.

3. In a railway car truck, spaced side frames each comprising tension and compression members and spaced columns defining a bolster opening, said tension member being of box section with the top chord of said box section widened and formed with inboard and outboard flanges defining a spring seat, each of said columns comprising a transverse wall and inboard and outboard bolster guide webs, a spring group on said seat, a bolster end supported on said group and having pockets at opposite sides thereof adjacent said walls, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, coaxial concave surfaces on said webs, convex surfaces on said bolster end at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, the distance between said inboard webs and said inboard flange being greater than the over-all depth of the bolster end whereby said bolster may be inserted and elevated in said bolster opening for slidably engaging said shoes with said columns.

4. In a railway car truck, spaced side frames each comprising spaced columns partly defining a bolster opening, each of said columns comprising a transverse wall and inboard and outboard webs, a bolster resiliently supported on said frames in said openings and having pockets in opposite sides thereof adjacent said columns, friction surfaces on said column walls, friction shoes in said pockets in engagement with said surfaces, concave surfaces on said webs, convex surfaces on said bolster end at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, each of said webs having a face at the outer extremity thereof formed in a plane substantially radial from the vertical axis of the corresponding frame, and abutment means on each bolster end disposed adjacent said faces, each of said abutment means having a face adapted to cooperate with the face on the adjacent web to limit relative rotation of said bolster with respect to each side frame.

5. In a railway car truck, spaced side frames each comprising tension and compression members and spaced columns defining a bolster opening, each of said columns comprising a transverse friction wall and inboard and outboard webs, a spring group on said tension member in said opening, a bolster end supported on said group and having pockets at opposite sides thereof adjacent said walls, friction shoes in said pockets in engagement with said walls, coaxial concave surfaces on said webs, convex surfaces on said bolster end at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit

longitudinal and lateral movement of said bolster with respect to said side frames, the distance between said inboard web and said tension member being greater than the over-all depth of said bolster end whereby said bolster may be inserted and elevated in said bolster opening for slidably engaging said shoes with said columns.

6. In a railway car truck, a side frame comprising spaced columns partly defining a bolster opening, each of said columns comprising a transverse wall and inboard and outboard webs, a bolster end resiliently supported on said frame in said opening and having pockets in opposite sides thereof adjacent said columns, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, concave surfaces on said webs, each of said concave surfaces being defined from the vertical axis of the associated side frame, and convex surfaces on said bolster end inboard and outboard said pockets adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster relative to said side frames, said inboard surfaces having their center of curvature outboard the vertical axis of the associated side frame, and said outboard surfaces being defined from a center of curvature inboard the vertical axis of the associated side frame, said centers being in alignment with each other and said axis transversely of the side frame.

7. In a railway car truck, a pair of side frames each comprising spaced columns with friction means, a bolster spring-supported between said columns, friction means supported by said bolster at opposite sides thereof and having frictional engagement with the friction means on said columns, inboard and outboard bolster-guide webs on said columns, each of said webs having coaxial concave surfaces, inboard and outboard convex surfaces on said bolster end at opposite sides of the associated friction means, said inboard surfaces having a center of curvature different from that of said outboard surfaces, said convex surfaces being adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, said centers of curvature being disposed at opposite sides of the vertical axis of said concave surfaces and being substantially equally spaced therefrom and in alignment with said axis transversely of the associated side frame, and stop means at the outer extremities of said surfaces to limit the horizontal angling of said bolster with respect to said side frames.

8. In a railway car truck, a pair of side frames each comprising spaced columns with friction surfaces, a spring group on said frame between said columns, a bolster supported on said spring group and having pockets in opposite sides thereof housing friction means in engagement with said surfaces, bolster guide webs on each column inboard and outboard said friction means, concave surfaces on said webs, each of said concave surfaces being defined from the vertical axis of the associated side frame and having substantially equal radii of curvature, inboard and outboard convex surfaces on said bolster adjacent said webs, said inboard surfaces having a center of curvature different from that of said outboard surfaces, the centers of curvature of the adjacent inboard and outboard convex surfaces being disposed at opposite sides of said axis and being aligned therewith transversely of the associated side frame, said inboard and outboard surfaces being adapted to cooperate with the concave surfaces on said webs to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames.

9. In a railway car truck, a pair of side frames each comprising spaced columns, a spring group on each of said frames between said columns, a bolster supported on said spring group, inboard and outboard guide webs on each column, curved surfaces on said bolster adjacent said webs adapted to engage curved surfaces on said webs to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, said bolster surfaces having different centers of curvature and said web surfaces having a common center of curvature, all of said centers of curvature being disposed in a plane extending transversely of said side frames, a lug projecting from said bolster at the outer extremity of each associated surface and having a face substantially radial with respect to the axis of the associated surface, said faces being adapted to cooperate with corresponding faces on said webs for limiting angling movement of said bolster relative to said side frames.

10. In a railway car truck, spaced side frames each comprising spaced columns partly defining a bolster opening, each of said columns comprising a transverse wall and inboard and outboard webs, a bolster resiliently supported on said frames between said columns and having pockets at opposite sides thereof adjacent said columns, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, coaxial concave surfaces on said webs, inboard and outboard convex surfaces on said bolster at opposite sides of each pocket, said inboard and outboard surfaces having other centers of curvature than said concave surfaces, said centers of curvature being aligned with each other and being disposed in a plane extending transversely of said side frames, said convex surfaces being adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster relative to said side frames.

11. In a railway car truck, spaced side frames each comprising top and bottom members and spaced columns merging therewith defining a bolster opening, each of said columns comprising a transverse wall and inboard and outboard webs, a spring seat on said bottom member, a spring group on said seat, a bolster end supported on said group in said opening and having pockets at opposite sides thereof adjacent said columns, friction surfaces on said walls, friction shoes in said pockets in engagement with said surfaces, coaxial concave surfaces on said webs and inboard and outboard convex surfaces on said bolster end at opposite sides of each pocket and adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster relative to said side frames, the inboard and outboard surfaces on said bolster having different axes disposed at opposite sides of the axis of said concave surfaces, all of said axes being aligned with each other transversely of said side frames.

12. A load-carrying member having a pair of spaced curved guide surfaces on each side thereof, one of the surfaces of each pair being defined

from one common axis of curvature and the other of the surfaces of each pair being defined from another common axis of curvature, the axes of curvature lying in a substantial vertical plane extending longitudinally of said member, and the radii of curvature of each pair of surfaces intersecting between said plane and the adjacent side of the load-carrying member.

13. In a railway car truck, a side frame comprising spaced columns and an intervening bolster opening, a spring group on said frame in said opening, a bolster end supported on said group, friction means supported by adjacent sides of said columns and said bolster end for controlling relative vertical movement between said bolster and columns, each of said columns having inboard and outboard guide members having curved surfaces adapted to cooperate with curved surfaces on opposite sides of said bolster to allow horizontal angling of said bolster end relative to said side frame while limiting the lateral and longitudinal movement of said bolster end relative to said side frame, the surfaces on said guide members and said bolster having different centers of curvature, said centers of curvature being aligned with each other transversely of said side frame, the surfaces on said guide members having substantially equal radii and the surfaces on said bolster having substantially equal radii.

14. In a railway car truck, a pair of side frames each comprising spaced columns partly defining a bolster opening, each of said columns comprising a transverse friction wall having inboard and outboard webs, a bolster resiliently supported on said frames, coaxial concave surfaces on said webs, inboard and outboard convex surfaces on said bolster adapted to cooperate with said concave surfaces to allow for horizontal angling of said bolster with respect to said side frames and to limit longitudinal and lateral movement of said bolster with respect to said side frames, said inboard surfaces having a center of curvature different from that of said outboard surfaces, said inboard and outboard surfaces having substantially equal radii, each of said concave surfaces having substantially equal radii, said centers of curvature being aligned with the axis of said concave surfaces transversely of said car truck.

15. In a railway car truck, a side frame comprising spaced columns, a relatively movable member spring-supported between said columns, each of said columns having inboard and outboard guide elements with substantially coaxial concave surfaces, and inboard and outboard convexly curved surfaces on opposite sides of said member, said inboard surfaces, said outboard surfaces, and said concave surfaces having different axes of curvature, each of said concave surfaces being adapted to cooperate with said convex surfaces to allow for horizontal angling of said member, said axes being aligned with each other transversely of said side frame.

16. A side frame comprising compression and tension members and spaced columns defining a bolster opening, a bolster having an end in said opening, each of said columns comprising a transverse wall and side webs, said walls having friction surfaces for engagement with friction means on said bolster end, said webs having inner coaxial curved guide surfaces, and outer nonconcentric surfaces on the opposite sides of said bolster and adapted for cooperation with the adjacent of said inner surfaces, the curvatures of said outer surfaces being formed and arranged to provide under static conditions substantially equal spacing in the direction transversely of said side frame between any portions of said outer surfaces and the corresponding portions of the adjacent of said inner surfaces, said arrangement permitting horizontal angling of said bolster with respect to the side frame and limiting longitudinal and lateral movement of the bolster with respect to the side frame.

17. A bolster of box section having end portions with pockets in the opposite sides thereof adapted to contain friction means therein, convex surfaces on each end portion inboard and outboard each pocket with the inboard surfaces being defined from one vertical axis and the outboard surfaces being defined from another vertical axis, the axis of said outboard surfaces being disposed inboardly of the axis of said inboard surfaces.

18. In a railway car truck, a side frame comprising spaced columns, a bolster spring-supported between said columns, and inboard and outboard guide members on said columns, said guide members and bolster having cooperating inboard and outboard curved surfaces permitting horizontal angling of said bolster relative to said side frame, said inboard bolster surfaces, said outboard bolster surfaces, and said column surfaces having different centers of curvature aligned transversely of said frame.

19. In a car truck, a load carrying member having each end thereof presenting at its opposite sides inboard and outboard convex column guide cooperating surfaces, the inboard surfaces having a different center of curvature than that of the outboard surfaces, said centers of curvature being disposed in a plane extending longitudinally of said member, the arcs defined by said surfaces intersecting each other at a point disposed in a plane extending transversely of said bolster and medially between the respective of said centers of curvature, side frames comprising column members disposed at opposite sides of said bolster adjacent the ends thereof and having inboard and outboard webs with a common center of curvature disposed intermediate said other centers of curvature and aligned therewith, said webs being arranged in cooperative relation with said inboard and outboard surfaces to permit horizontal angling between said member and said side frames and to limit longitudinal and lateral movement of said member relative to said side frames.

20. In a car truck, a side frame having spaced column members, a load carrying member between said columns, inboard and outboard curved surfaces on said load carrying and column members adapted for engagement with each other to allow relative horizontal angling between said load carrying member and said side frame and to limit longitudinal and lateral movement of said load carrying member relative to said side frame, the inboard and outboard surfaces on said load carrying member being defined from different centers of curvature and the surfaces on said column members being defined from a common center of curvature different from that of said last-mentioned surfaces, the centers of curvature of all of said surfaces being disposed in alignment transversely of said frame.

21. In a car truck, a side frame having spaced column members, a load carrying member between said column members, inboard and outboard curved surfaces on said load carrying and column members adapted for engagement with

each other to allow relative horizontal angling between said load carrying member and said side frame and to limit longitudinal and lateral movement of said load carrying member relative to said side frame, the inboard and outboard surfaces on said load carrying member being defined from different centers of curvature and the surfaces on said column members being defined from a common center of curvature different from that of said last-mentioned surfaces all of said centers of curvature being aligned transversely of said side frame, the arcs defined by said inboard and outboard surfaces intersecting each other at points disposed in the vertical plane substantially bisecting said frame longitudinally, said plane extending through said common center of curvature.

22. A load carrying member having a pair of spaced curved guide surfaces adjacent an end thereof, and a pair of spaced curved guide surfaces remote from said end, the adjacent surfaces being defined from a common center and the remote surfaces being defined from a common center adjacent said first-mentioned center, said centers being disposed in a plane extending longitudinally of said member, the arcs defined by the surfaces of the pair intersecting each other at a point disposed in a vertical plane extending transversely of said member medially between said centers.

23. In a car truck, a side frame member having spaced column guide portions, a relatively movable member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members and to limit relative longitudinal and lateral movement of said load carrying member relative to said side frame member, the surfaces on the guide portions of one of said members being defined from a common center, and the guide portions of the other of said members having the inboard surfaces thereof defined from a center of curvature different from that of the center of curvature of the outboard surfaces thereof, said centers of curvature being aligned transversely of said one member.

24. In a car truck, a side frame member having spaced column guide portions, a relatively movable member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members and to limit relative longitudinal and lateral movement of said load carrying member relative to said side frame member, the guide portions of one of said members having the inboard surfaces thereof defined by a center of curvature different than that of the outboard surfaces thereof, said centers of curvature being disposed at opposite sides of a vertical plane bisecting said frame member longitudinally and being substantially equally spaced therefrom and being aligned transversely of said frame member.

25. In a car truck, a side frame comprising spaced columns with friction means, a bolster supported between said columns, friction means on said bolster at opposite sides thereof and having engagement with the friction means on said columns, each of said columns having inboard and outboard bolster guide means on opposite sides of the associated friction means, inboard and outboard convex surfaces on said bolster on opposite sides of the associated friction means adapted to cooperate with concave surfaces on said guide means, said inboard convex surfaces having a center of curvature different than that of the outboard convex surfaces, and said concave surfaces having a common center of curvature, said centers of curvature being aligned transversely of said side frame, said common center of curvature being disposed in a plane substantially bisecting said side frame longitudinally.

26. In a car truck, a side frame member having spaced column guide portions, a relatively movable load carrying member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members and to limit relative longitudinal and lateral movement of said load carrying member relative to said side frame member, the guide portions of one of said members having the inboard surfaces thereof defined from a center of curvature different than that of the outboard surfaces thereof, and the guide portions of the other of said members having the inboard and outboard surfaces thereof defined from a common center of curvature spaced from the center of curvature of said last-named surfaces, the centers of curvature of the respective surfaces being disposed in alignment in a plane extending transversely of said side frame member.

27. In a car truck, a side frame member having spaced column guide portions, a relatively movable load carrying member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members and to limit relative longitudinal and lateral movement of said load carrying member relative to said side frame member, the guide portions of one of said members having the inboard surfaces thereof defined from a center of curvature different than that of the outboard surfaces, the respective centers of curvature of said last-mentioned inboard and outboard surfaces being substantially equally spaced from and being disposed on opposite sides of a common center of curvature of the inboard and outboard surfaces on the guide portions of the other of said members, all of said centers of curvature being aligned transversely of said last-mentioned member, said common center of curvature lying in the vertical plane substantially bisecting said last-mentioned member longitudinally.

28. In a car truck, a side frame member having spaced column guide portions, a relatively movable load carrying member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members and to limit relative longitudinal and lateral movement of said load carrying member relative to said side frame member, the guide portions of one of said members having the inboard surfaces thereof defined from a center of curvature different than that of the outboard surfaces, the respective centers of curvature of said last-mentioned inboard and

outboard surfaces being disposed on opposite sides of a common center of curvature of the inboard and outboard surfaces on the guide portions of the other of said members, all of said centers of curvature lying in a plane extending transversely of said other member, said common center of curvature being disposed intermediate said other centers of curvature and being equally spaced therefrom, the adjacent extremities of said inboard and outboard surfaces on said guide portions presenting faces adapted for engagement to limit said angling movement between said members.

29. In a car truck, a side frame member having spaced column guide portions, a relatively movable member therebetween and having portions for guiding engagement with said guide portions, the portions of said members having cooperating inboard and outboard curved surfaces adapted for engagement to allow relative horizontal angling between said members, the guide portions of one of said members having the inboard surfaces thereof defined from an axis different than that of the outboard surfaces thereof, and the guide portions of the other of said members having their surfaces defined from a common axis spaced from the axes of said last-mentioned surfaces, all of said axes being aligned transversely of said other member, the axes of the corresponding surfaces on the last-mentioned member and the other of said members becoming coaxial upon engagement.

30. A load-carrying member having spaced inboard and outboard curved guide surfaces at opposite sides thereof, said inboard surfaces being defined from a common axis of curvature and said outboard surfaces being defined from another common axis of curvature, the last-mentioned axis of curvature being disposed inboardly of the first-named axis of curvature.

31. A railway car truck member comprising curved bearing surfaces for cooperation with an associated relatively movable member, said surfaces being struck from different axes of curvature and the radii of curvature of respective surfaces intersecting intermediate said surfaces and axes.

32. In a railway car truck, a side frame having a bolster opening, a column at each side of the opening, a spring seat at the bottom of said opening, a bolster having an end in said opening, spring means on said seat supporting said end, and spring-confining means on said seat, each column having a transverse wall and side webs, said walls having friction surfaces for cooperation with friction means carried by said bolster end, said webs and bolster end having cooperating inboard and outboard curved surfaces permitting horizontal angling of said bolster relative to said side frame, said inboard bolster surfaces, said outboard bolster surfaces and said column surfaces having different centers of curvature aligned transversely of said frame, said webs extending below the upper level of said spring means in the normal operating position of said bolster and being partially aligned with the same longitudinally of said frame and arranged to cooperate with said spring-confining means under certain conditions positioning said bolster free of said spring means for maintaining said spring means in said opening.

33. In a truck, a side frame comprising top and bottom members and spaced columns therebetween defining a bolster opening therewith, a spring seat on the bottom member between said columns widened transversely of the frame, a spring group on said seat extending inboardly and outboardly of said columns, a bolster seated on said spring group, confining means on the bolster and seat for confining said spring group, and means on said columns formed and arranged to cooperate with said confining means on said seat for confining said spring group in said opening under conditions unseating the bolster from said springs, said means comprising inboard and outboard webs on said columns projecting respectively inboardly and outboardly of the frame and having coaxial concave guide surfaces extending partially around said spring group inboardly and outboardly of the frame, said webs being spaced closer to said spring group at points spaced from said columns than said columns.

34. In a railway car truck, a side frame comprising spaced columns in part defining a bolster opening, a spring seat between the columns at the lower end of said opening widened transversely of the frame and extending inboardly and outboardly of said columns, spring means in said opening on said seat including a plurality of inboard and outboard springs extending inboardly and outboardly of the columns, a bolster extending into said opening and seated on said spring means, spring confining means on the bolster and seat for confining said springs in said opening, and means on said columns adapted to cooperate with said confining means on said seat for maintaining said springs in said opening under conditions imposing a shock longitudinally of the frame and unseating said bolster from the springs and moving it to the upper end of said opening, said means comprising abutments on said columns extending inboardly and outboardly of the frame beyond the vertical axes of said inboard and outboard springs transversely of the frame in alignment with adjacent springs longitudinally of the truck, said abutments being formed with coaxial concave guide surfaces arranged to afford stops for the springs to prevent their falling out of said opening in paths located in vertical planes extending diagonally with respect to the plane of the frame.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,757,765	Dreibuss et al.	May 16, 1930
2,084,028	Hedgcock	June 15, 1937
2,175,166	Cottrell	Oct. 10, 1939
2,237,953	Webb	Apr. 8, 1941
2,257,109	Davidson	Sept. 30, 1941
2,333,921	Flesch	Nov. 9, 1943
2,352,595	Bachman	July 4, 1944
2,435,384	Clasen	Feb. 3, 1948