United States Patent

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[54] ELASTOMERICALLY SPRUNG TRANSOM AND BOLSTER CAR TRUCK

19 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **105/182,** 29/239, 29/401, 29/436, 105/133, 105/197, 105/179, 105/202, 105/206, 105/208.1

[51] **Int. Cl.** **B61c 3/00,** B61f 3/04, B61f 5/00

[50] **Field of Search** 105/133, 136, 182, 185, 197, 199, 202, 208, 157, 206, 208.1, 208.2; 29/239, 401, 436

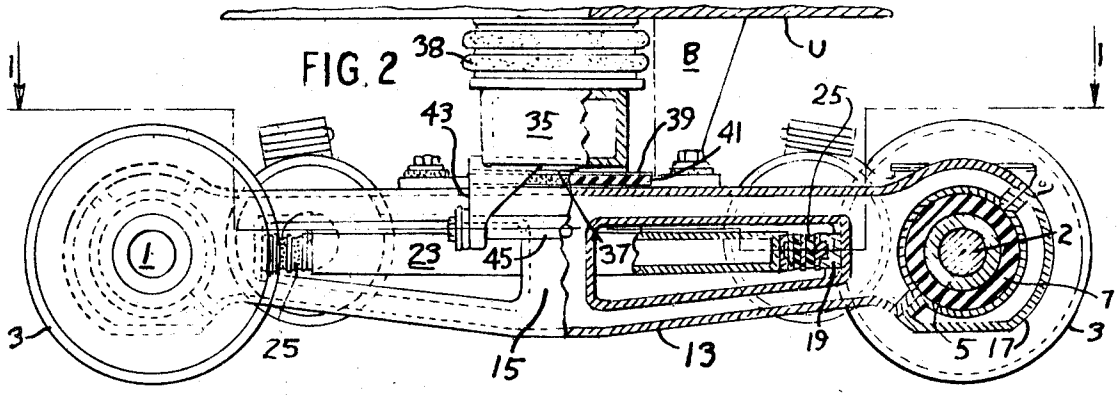
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Primary Examiner—Arthur L. La Point
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ABSTRACT: Railway vehicle trucks having framing comprising separate side frames supported at their ends on the axles, and a transverse frame member supported on the side frames by rubber pad devices of V-shape in plan spaced apart longitudinally of the truck, with their apices pointed in opposite directions lengthwise of the truck for permitting differential equalizing movements of the side frames relative to each other through vertical sheer in the pads while maintaining the side frames and transverse frame member in substantially fixed relation in the horizontal plane by the resistance of the pads to compression. A transverse bolster is pivoted on a vertical axis to the center of the transverse frame member and is slidably supported on the framing at the sides. At its ends the bolster mounts body support springs and means for transmitting longitudinal forces between the bolster and a supported body. This arrangement permits free differential equalization by separate side frames while maintaining the side frame in tram by providing a rigid transverse frame member, yet permits the use of a transverse frame member of minimum weight by supporting the bolster at the sides rather than at the center of the transverse frame member. Improved means is also disclosed for adjusting the height of the transverse frame to compensate for wheel wear.



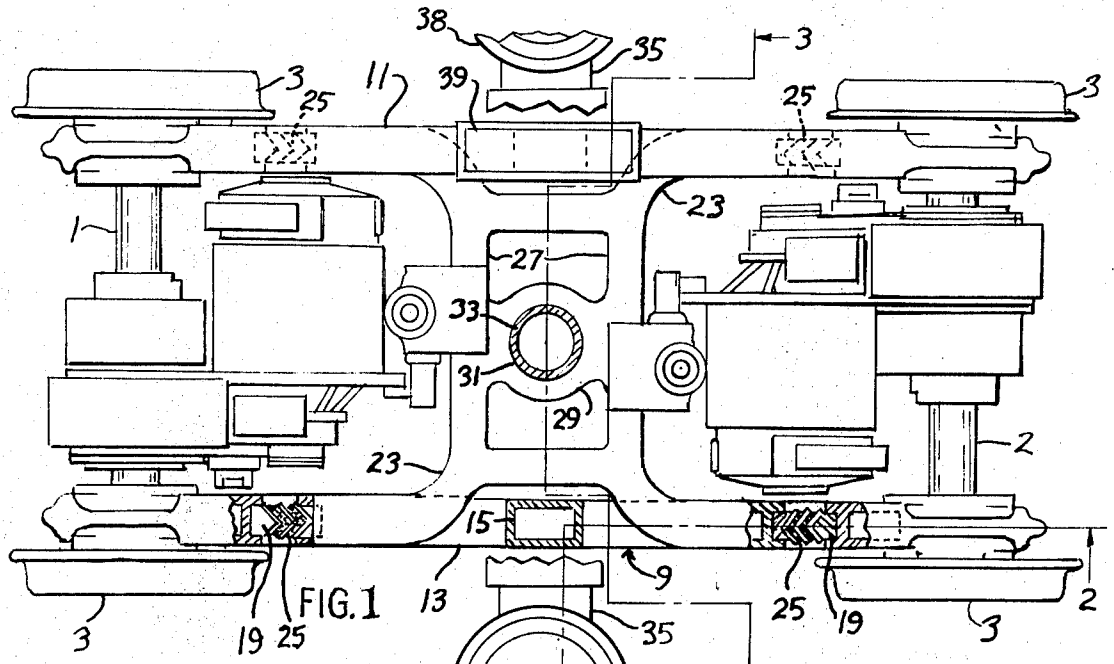


FIG. 1

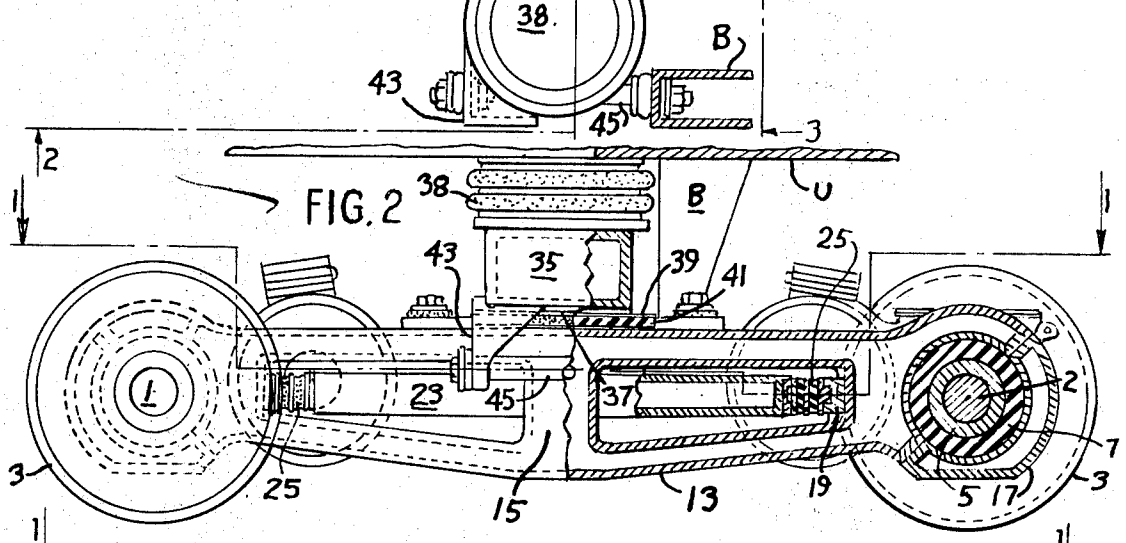


FIG. 2

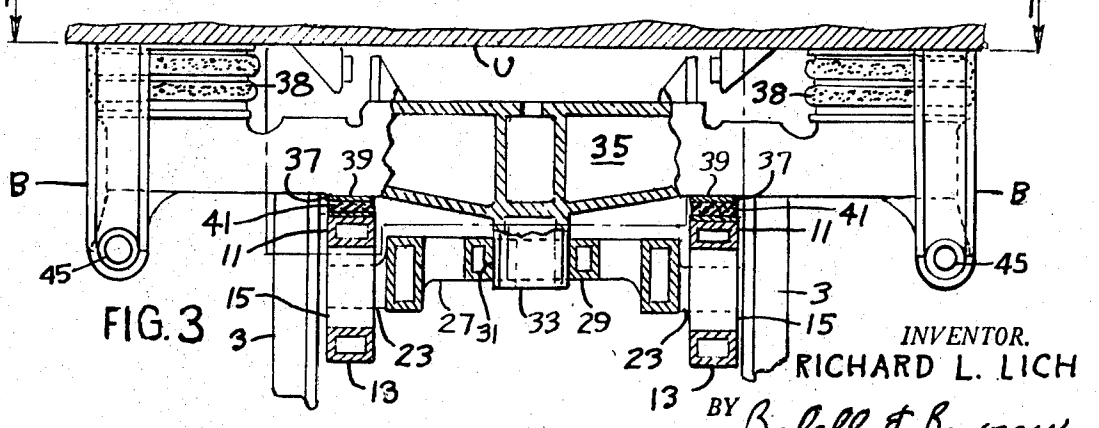


FIG. 3

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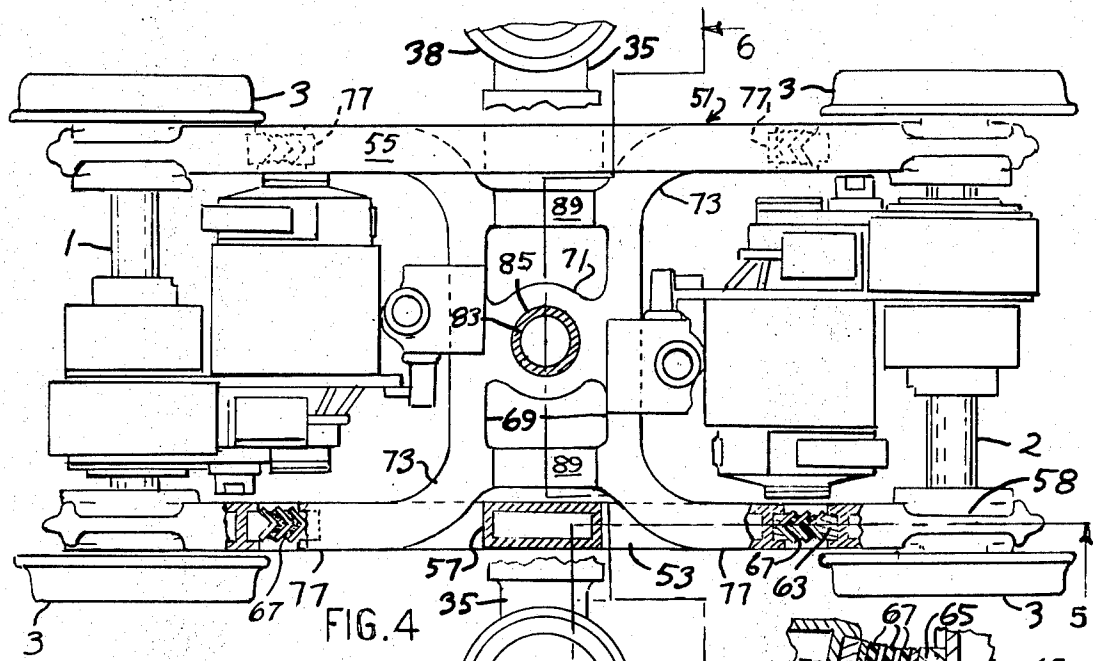


FIG. 4

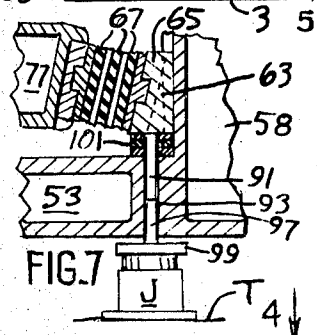


FIG. 7

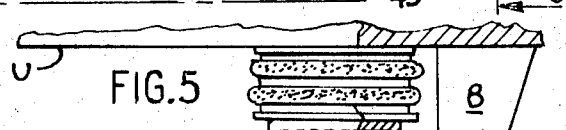
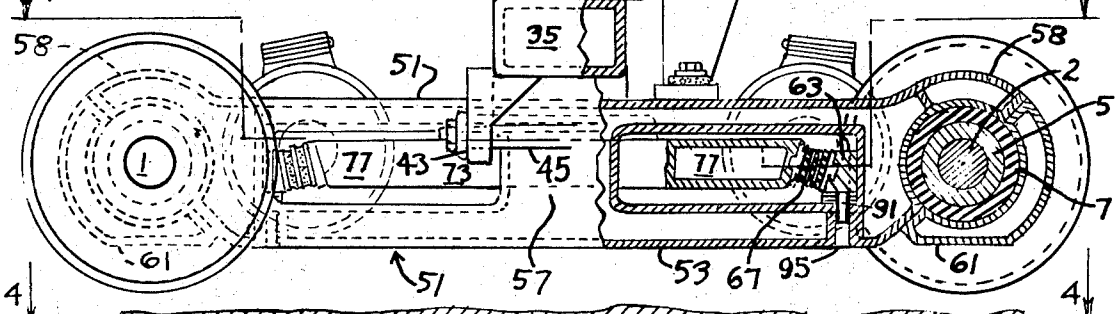


FIG. 5



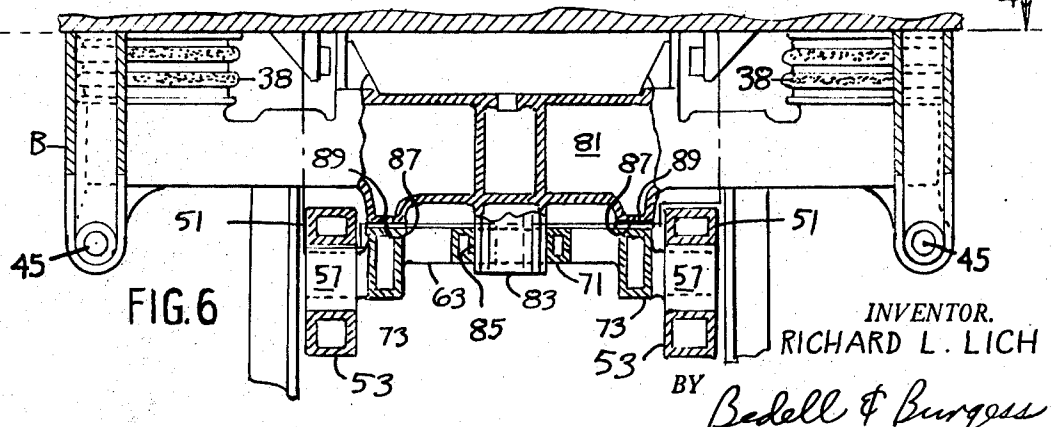


FIG. 6

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ELASTOMERICALLY SPRUNG TRANSOM AND BOLSTER CAR TRUCK

FIELD OF THE INVENTION

The invention relates to railway rolling stock and consists particularly in a two-axle railway vehicle truck of the type in which a bolster, mounting body-support springs, is swivelly supported on truck framing carried by the axles.

DESCRIPTION OF THE PRIOR ART

In railway trucks of the type in which the bolster is swivelly supported on the truck frame and mounts body-support springs, the bolster is usually supported at the center of the frame by a pivot bearing as, for example, in U.S. Pat. No. 2,877,719, and the frame has pedestal jaws at its corners to receive the axle boxes and is supported on springs carried by the axle boxes or by equalizing bars seated on the axle boxes. This construction requires a heavy transverse frame member because of the high bending moment caused by the central support thereon of the bolster, and the weight of the frame is also increased by the use of pedestal jaws to position the axle boxes.

SUMMARY OF THE INVENTION

The invention provides a very light weight, yet positively trammed and fully equalized truck suitable for high-speed passenger service, by mounting separate side frames directly on the axle boxes, supporting a rigid transverse frame member on the side frames by substantially upright V-shaped rubber elements pointed in opposite directions longitudinally of the truck, pivoting the bolster to the center of the transverse frame member, and supporting the bolster at the sides of the truck.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a truck embodying the invention, partially horizontally sectionalized along lines 1–1 of FIGS. 2 and 3.

FIG. 2 is a side elevation view of the truck illustrated in FIG. 1 taken along line 2–2 of FIG. 1.

FIG. 3 is a transverse vertical sectional view along line 3–3 of FIG. 1.

FIG. 4 is a plan view of a modified form of the invention.

FIG. 5 is a side elevation view of the truck illustrated in FIG. 4, partially sectionalized along line 5–5 of FIG. 4.

FIG. 6 is a transverse vertical sectional view along line 6–6 of FIG. 4.

FIG. 7 is an enlarged fragmentary longitudinal vertical sectional view along line 5–5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the embodiment illustrated in FIGS. 1—3 the numerals 1, 2 refer to spaced railway axles, each provided at its ends with wheels 3 spaced apart transversely of the truck. Inwardly of wheels 3, bearings 5, preferably of the antifriction type, are mounted on axles 1, 2 and (through elastomeric sleeves 7) support the ends of longitudinally extending side frame members 9 which are spaced apart transversely of the truck and are preferably of king post truss configuration, having a substantially horizontal top chord 11, bottom chord 13 and, intermediate their ends, an upright strut or king post 15. At their ends side frames 9 are formed with convex semicircular recesses to receive the elastomeric sleeves 7 on bearings 5 and for holding the bearings, sleeves and side frames in assembled relation, semicircular end caps 17 are removably secured to the end surfaces of the side frames.

For connecting the side frames to each other and for maintaining them in squared or trammed relation, yet permitting their differential tilting movements in their longitudinal vertical planes, the windows defined in each of the side frames by top chord 11, bottom chord 13 and strut 15 are provided with

upright surfaces 19 at their outboard ends which are V-shape in plan with their apices pointing toward the center of the side frame, and a transverse frame member comprising longitudinally extending side members 23 formed with V-shape indentations at their ends to receive corresponding V-shape resilient devices comprising elastomeric pads 25 interleaved with V-shape metal plates, side members 23 being indented transversely of the truck intermediate their ends for a purpose which will appear hereinafter.

Side members 23 are rigidly connected to each other by transverse beams 27 spaced apart longitudinally of the truck and connected intermediate their ends by a longitudinally extending element 29, centrally vertically cylindrically apertured as at 31 to receive a cylindrical boss 33 depending from the center of transverse bolster 35, which is also formed at its end portions with downwardly facing side bearings 37, by means of which it is supported directly on resiliently supported side bearing plates 39 on the upper chords 11 of side frames 9, there being a resilient elastomeric pad element 41 between each side frame and each side bearing plate 39 to accommodate the differential tilting of the side frames without interference with the sliding support of the bolster thereon.

With the arrangement described, the transverse frame member 23, 27, 29 is supported on the side frames by elastomeric sandwiches 25 and free tilting movement of the side frames with respect to the transverse frame is accommodated by sandwiches 25 yielding vertically in shear, relative transverse and longitudinal movements of the side frames relative to the transverse frame 23, 27, 29 being prevented by the resistance of sandwiches 25 to compression longitudinally and transversely of the truck. Because bolster 35 is supported directly on the side frames and not on the transverse frame 23, 27, 29, the latter may be of very light weight construction and, in effect, since sandwiches 25 support only the weight of lightweight frame 23, 27, 29, the latter floats on the side frames, all vertical loading passing directly from the bolster into the side frames.

Bolster 35 is preferably provided at its ends with upstanding springs 38 which are flexible transversely as well as vertically and support a car underframe U. For preventing swivel between bolster 35 and car underframe U and for transmitting longitudinal tractive and retardation forces therebetween, underframe U is provided at each side with a depending bracket B to the lower end of which is secured a longitudinally extended link 45 the other end of which is secured to a corresponding bracket 43 depending from the end portion of bolster 35.

Operation of the truck is as follows: During movement over track having differing vertical irregularities in both its rails, differential tilting movements of side frames 9 to assure constant contact between the wheels and the rails and to assure equal distribution of load to the wheels is accommodated by the yieldability in vertical shear of sandwiches 25 and by yieldability in compression of pads 41 supporting side bearing plates 39 on the side frames, all vertical load being transmitted from the body through springs 38, the end portions of bolster 35, side bearings 37, side frame side bearing plates 39 and elastomeric pad elements 41 direct to the side frames. Cooperating bolster boss 33 and transverse frame cylindrical recess 31 function only to provide a pivot about a vertical axis and have no vertical load-supporting function.

In the embodiment illustrated in FIGS. 4—6, side frames 51 are of generally truss shape having a bottom chord 53, top chord 55 and an intermediate strut or column 57. The end portions 58 of side frames 51 are formed with concave semicylindrical openings 59 to receive axle boxes 5 which are surrounded by grommets or sleeves 7 of elastomeric material and are secured to the side frames by semicylindrical end caps 61.

In the windows formed in the side frames between the top and bottom chords and between columns 57 and side frame end portions 58 are seated upstanding blocks 63 which are formed with a slightly sloping surface 65 facing toward the

center of the side frame, surface 65 sloping outwardly and upwardly lengthwise of the truck and being of substantially V-shape in plan with its apex pointed toward the center of the side frame. Mounted on surface 65 of blocks 63 are similarly oriented springs consisting of chevron or V-shaped rubber pads 67 interleaved with metal plates. A transverse frame member comprising a pair of transversely extending beams 69 spaced apart lengthwise of the truck and connected at their centers by a longitudinally extending member 71 is formed with a longitudinally extending side member 73 the end portions 75 of which are curved outwardly transversely of the truck to clear side frame columns 57 and their extremities 77 extend into the end side frame windows where they, formed with V-shaped recesses in plan slightly inclined vertically outwardly and upwardly lengthwise of the truck, are seated on the upper and inner surfaces of elastomeric springs 67. With the arrangement as thus described, the side frames are substantially secured against relative movements with respect to transverse frame members 69 and to each other by the resistance of springs 67 to compression both longitudinally and transversely of the truck. However, some differential tilting of the side frames in their longitudinal vertical planes with respect to each other is freely accommodated by the yieldability of springs 67 in shear along the axis of their inclination. By virtue of inclination of springs 67 they are capable of supporting the weight not only of the transverse frame 69, but also the weight of a supported body which is supported in part by their resistance to vertical compression and their resistance to shear vertically.

For supporting the vehicle body on trucks of this type, a transverse bolster 81 is formed at its center with a depending cylindrical boss 83 which is pivotally received in a cylindrical opening 85 in transverse frame central member 71, and immediately inwardly of the side frames bolster 81 is formed with downwardly facing bearing surfaces 87 which are slidably received on upwardly facing bearing surfaces 89 on transverse framing longitudinal side members 73 so that by virtue of the load being carried in close proximity to the supports of the transverse framing on the side frames, and pivotal relation only between the bolster and the central portion of the transverse framing, bending moments on the transverse framing will be minimized and the transverse framing can be made correspondingly light in weight and of lower strength then would otherwise be required. As in the first embodiment of the invention, at its ends bolster 81 is provided with substantially upright springs 38, preferably of pneumatic type, which are yieldable in shear as well as vertically to accommodate relative transverse movements between the bolster and the supported vehicle underframe U, and the end portion of the bolster is also provided with a depending bracket 43 for connection by means of longitudinally extending anchor links 45 to bracket B rigidly depending from underframe U, whereby to transmit longitudinal draft and retardation forces between the bolster and the underframe and to prevent swivelling of the bolster with respect to the underframe, while freely accommodating such transverse and vertical movements of the underframe as are permitted by springs 38.

Operation of the second embodiment of the invention is generally similar to that of the first embodiment as previously described, except that the support of the bolster on transverse framing side members 73 in the second embodiment, though requiring a slightly heavier and stronger transverse framing than the first embodiment, eliminates the need of resilient means under the side bearing plate to accommodate relative tilting of the side frames lengthwise of the truck. Thus in the second embodiment the entire body load is transmitted from through side bearings 87, 89 into the transverse framing side members 73, 75 and through their extremities 77, springs 67 and blocks 63 into the side frames, and thence to the wheels.

For ease in maintaining the body at its proper height from the rail after substantial wheel wear has occurred, spring-supporting blocks 63 are formed with depending projections 91 which are vertically slidably received in mating apertures 93 in the side frames. A registering opening 95 in the lower portion of the side frame permits the insertion of a lifter comprising a shank 97 and a disk-shape base 99. Lifter 97, 99 is sufficiently long to protrude from the bottom of the side frame when engaging the bottom of projection 91 in its uppermost portion, and sufficiently short to permit a power jack J to be positioned beneath its base when the block 63 is in its lowest position. For elevating block 63, lifter shank 97 can be slid vertically into opening 95 until it engages the lower end of spring block depending projection 91 and jack J can be positioned on a tie T or other fixed stationary element of the roadbed beneath base 99 and operated until the body is raised to its proper height, after which one or more shims 101 can be inserted in the space between block 63 and the upper surface of side frame bottom chord 53. With this arrangement, even though vertical space between the bottom of the side frame bottom chord and the track is extremely limited, a jack can be readily used.

The details of the trucks disclosed herein may be varied without departing from the spirit of the invention and exclusive use of modifications coming within the scope of the appended claims is contemplated.

I claim:

1. A railway vehicle truck comprising a pair of wheeled axles spaced apart longitudinally of the truck, framing comprising separate transversely spaced longitudinally extending side frames supported at their ends on end portions of said axles and a rigid transverse frame, generally vertical elastomeric means resiliently supporting said transverse frame on said side frames and permitting longitudinal tilting movements of said side frames with respect to said transverse frame and to each other principally through vertical shear in said elastomeric means but preventing substantial transverse and longitudinal movements of said side frames with respect to said transverse frame principally by resistance of said elastomeric means to compression, a transverse bolster, vertically unloaded means pivotally connecting said bolster to said transverse frame at the center of the truck for swivel movement about a vertical axis, and cooperating means on said bolster and on the side portions of said framing forming the sole support of said bolster on said framing.

2. A railway vehicle truck according to claim 1 wherein said bolster supporting means are on said side frames.

3. A railway vehicle truck according to claim 2 wherein said bolster supporting means comprise upwardly facing bearing surfaces on said side frames and said bolster is formed with downwardly facing surfaces slidably engaging said upwardly facing surfaces.

4. A railway vehicle truck according to claim 2 in which said bolster support means include vertically resilient elements to accommodate differential tilting movements of said side frames longitudinally of the truck.

5. A railway vehicle truck according to claim 1 wherein said bolster supporting means are on the side portions of said transverse frame.

6. A railway vehicle truck according to claim 5 wherein said bolster supporting means comprise upwardly facing bearing surfaces on side portions of said transverse frame and said bolster is formed with downwardly facing surfaces slidably engaging said upwardly facing surfaces.

7. A railway vehicle truck according to claim 1 in which said elastomeric means are spaced apart longitudinally of said side frames.

8. A railway vehicle truck according to claim 7 wherein said elastomeric means each comprises an elastomeric pad device of substantially V-shape in plan with its opposite surfaces of corresponding V-shape and with its apex pointed inwardly longitudinally of the truck, there being corresponding V-shaped surfaces on longitudinally spaced apart opposing parts of said transverse frame and said side frames, the opposite V-shaped surfaces of each pad device engaging said corresponding surfaces of said transverse frame and the associated side frames respectively.

9. A railway vehicle truck according to claim 8 wherein seats for said elastomeric elements are vertically slidably mounted on an upper surface of said side frame and form said V-shaped surface of said side frame, said side frames being vertically apertured beneath said seats, each of said elements having a depending projection slidably received within said side frame aperture.

10. A railway vehicle truck according to claim 8 wherein said pads are vertically disposed to support said transverse frame solely through resistance of said pads to shear and said bolster support means are on said side frames whereby said transverse frame is free of the bolster-supported load.

11. A railway vehicle truck according to claim 10 wherein said bolster support means comprise opposing horizontal bearings on said bolster and said side frames.

12. A railway vehicle truck according to claim 11 wherein said opposing horizontal bearings include vertically resilient elements to accommodate differential tilting movements of said side frames longitudinally of the truck.

13. A railway vehicle truck according to claim 8 wherein said side frame corresponding surfaces are inclined upwardly longitudinally of the truck away from said opposing transverse frame surfaces whereby said pad devices are stressed in compression as well as in shear by the vertical load of said transverse frame.

14. A railway vehicle truck according to claim 13 wherein said transverse frame is provided with upwardly facing bearings surfaces near its sides, said upwardly facing bearing surfaces forming part of said bolster support means.

15. A railway vehicle truck according to claim 7 wherein said side frames are trusses having vertically spaced top and bottom chords, said elastomeric means being located between said top and bottom chords, said transverse frame having longitudinally extending side members extending into the spaces between said side frame top and bottom chords and there being supported by said elastomeric means.

16. A railway vehicle truck according to claim 15 including upright strut means connecting said side frame top and bottom chords intermediate their ends, and dividing the space between said chords into separate windows, said individual elastomeric means being located in different windows of each side frame, said transverse frame side members being indented transversely inwardly intermediate their ends sufficiently to clear said upright strut means.

17. A railway vehicle truck according to claim 16 in which said bolster support means comprises upwardly facing bearings on the upper chord of said side frames over said strut means.

18. A railway vehicle truck according to claim 17 in which said bolster support means comprises upwardly facing bearings on the indented portions of said transverse frame side members.

19. In a railway vehicle truck having a side frame element with a horizontal top surface, a spring device supported thereon and comprising a block having a horizontal bottom surface and an elastomeric pad device secured to a side of said block for resiliently supporting a truck member through resistance of said pad device to vertical shear, a vertical aperture through said side frame beneath said block, and a projection depending from said block and being vertically slidably received and terminating within said aperture, and forming a vertical guide.