April 22, 1958 R. L. LICH 2,831,440

RAILWAY TRUCK

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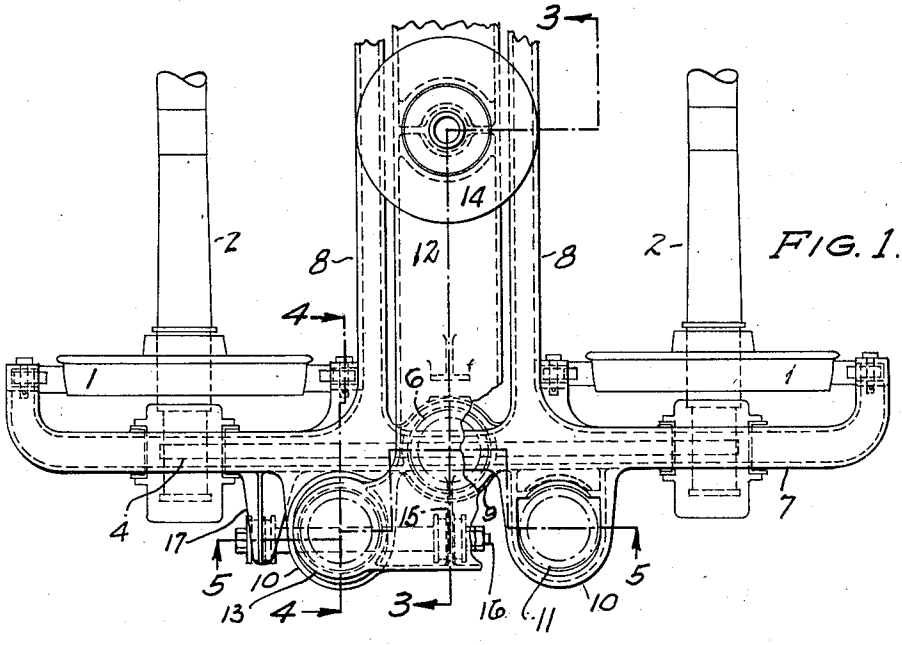


FIG. 1.

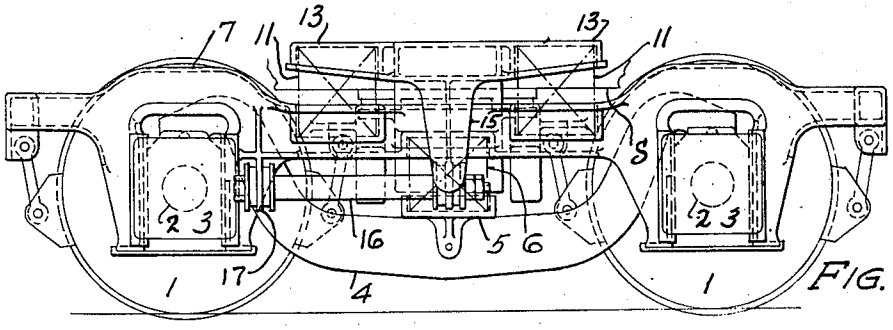


FIG. 2.

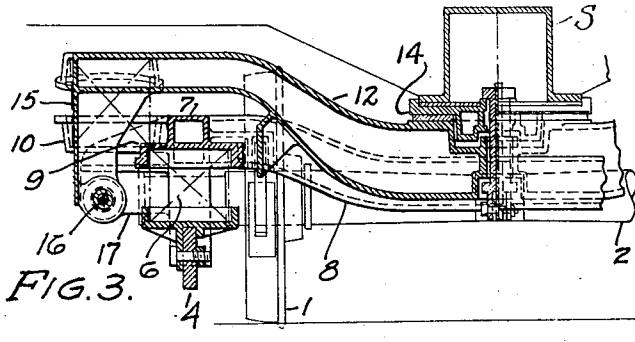


FIG. 3.

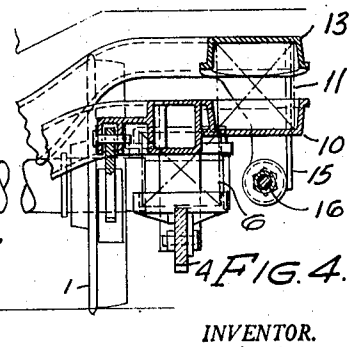


FIG. 4.

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RAILWAY TRUCK

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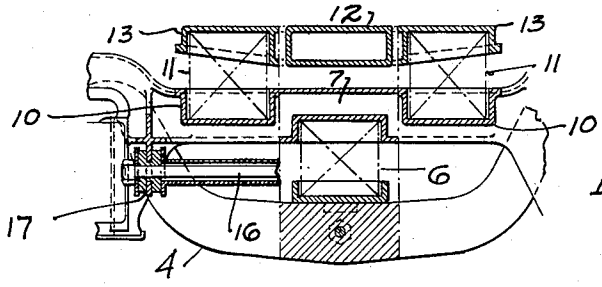


FIG. 5.

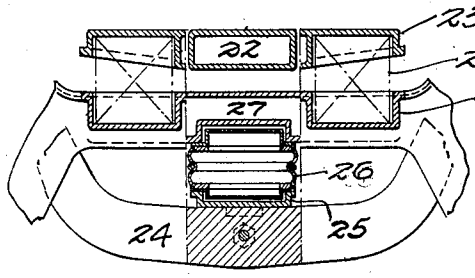


FIG. 6.

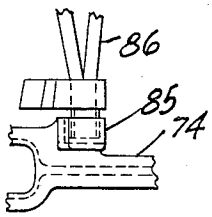


FIG. 17.

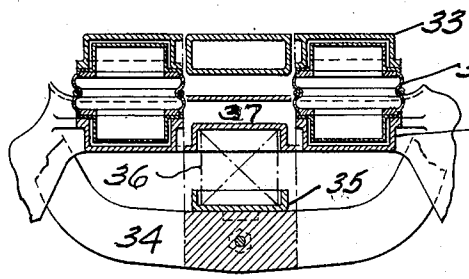


FIG. 7.

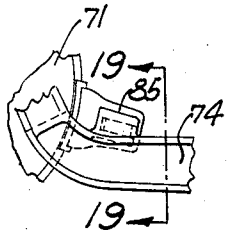


FIG. 18.

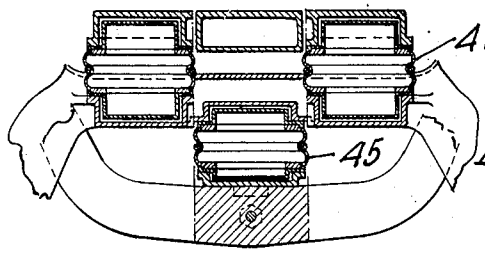


FIG. 8.

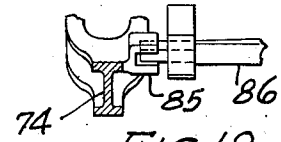


FIG. 19.

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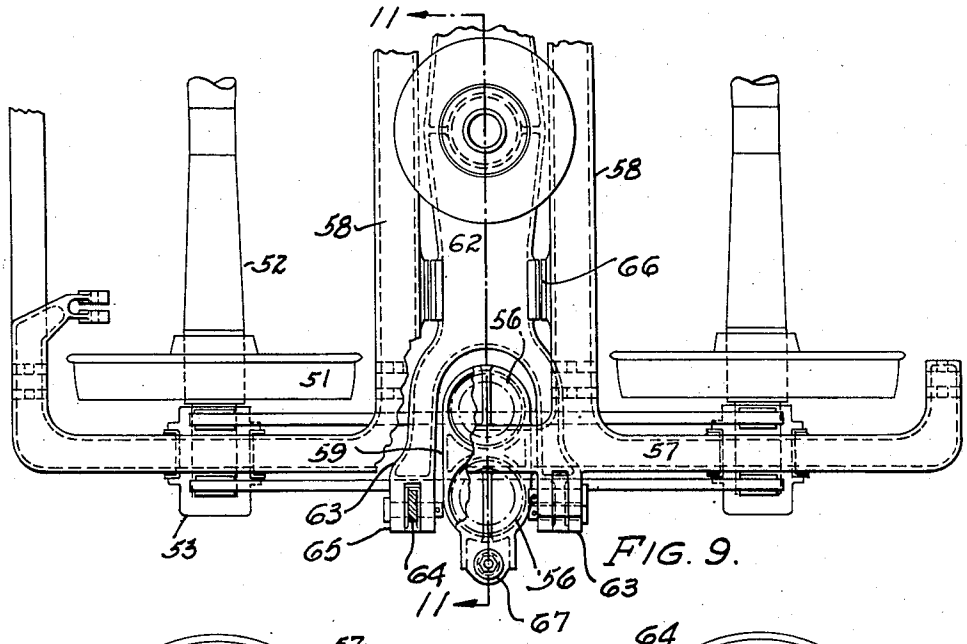


FIG. 9.

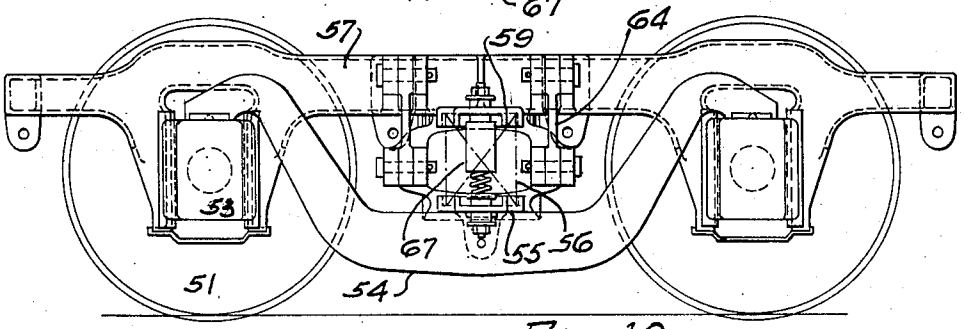


FIG. 10.

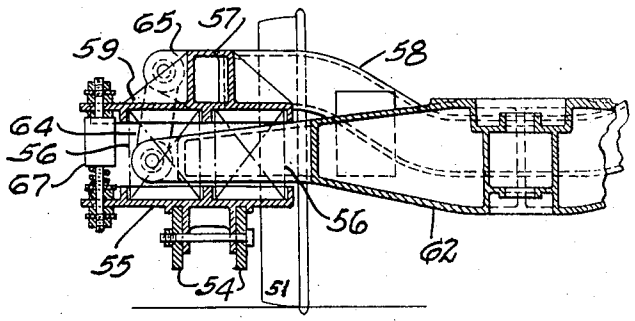


FIG. 11.

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RAILWAY TRUCK

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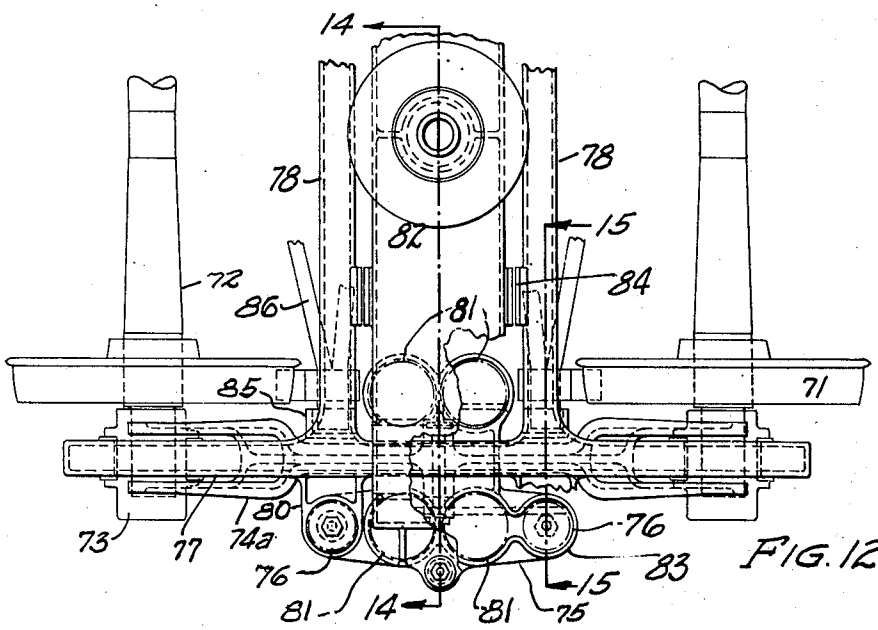


FIG. 12.

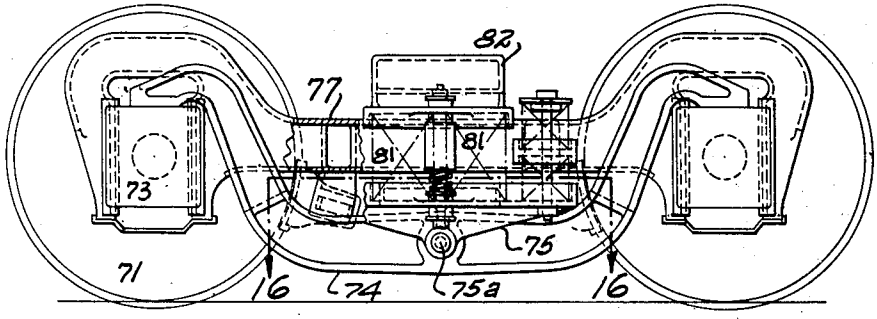


FIG. 13.

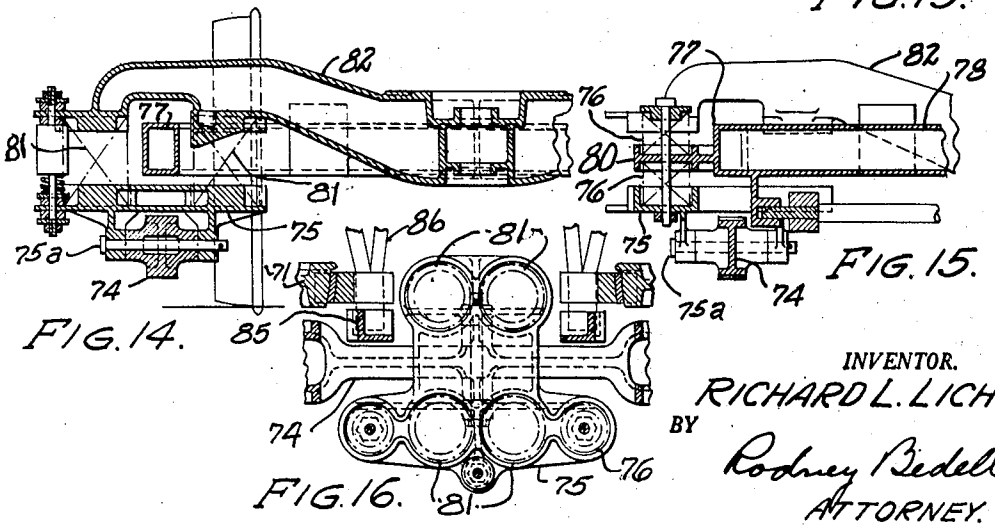


FIG. 14.

FIG. 15.

FIG. 16.

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United States Patent Office 2,831,440 Patented Apr. 22, 1958

2,831,440

RAILWAY TRUCK

Richard L. Lich, Ferguson, Mo., assignor to General Steel Castings Corporation, Granite City, Ill., a corporation of Delaware

Application October 17, 1955, Serial No. 540,977

21 Claims. (Cl. 105—190)

The invention relates to railway rolling stock and more particularly to truck structure having a double spring system between wheeled axles and the load-carrying member of the truck and embodying a complete equalization of the load to the spaced wheeled axles.

One object of the invention is to utilize rigid equalizing members extending between spaced wheeled axles supported directly upon the axle journal boxes and to provide each equalizer with a yielding pivot-like support for a truck frame intermediate the journal boxes, thereby achieving more nearly complete equalization than is possible with conventional equalized trucks in which the frame is supported on the equalizer by springs widely spaced longitudinally of the truck.

Another object is to stabilize a truck frame, supported as described above, particularly against tilting in the longitudinal vertical plane of the truck.

Another object is to avoid the blocking out of the equalizing spring action during the application of brakes.

Another object is to effectively maintain the bolster and frame relation lengthwise of the truck in combination with the equalization system described above.

Reference is made to earlier applications by the same inventor, filed June 25, 1953, Serial No. 363,993, and December 31, 1954, Serial No. 479,188, having similar general objects but substantially different structures.

The accompanying drawings illustrate six different forms of the present invention. In these drawings:

Figure 1 is a top plan view of one longitudinal half of a railway vehicle truck embodying one form of the invention in which the coil spring units support the truck frame upon the equalizers and other coil spring units support the truck bolster upon the truck frame.

Figure 2 is a side elevation of the truck shown in Figure 1.

Figure 3 is a vertical transverse section taken on line 3—3 of Figure 1.

Figure 4 is a detail vertical transverse section on line 4—4 of Figure 1.

Figure 5 is a detail vertical longitudinal section on line 5—5 of Figure 1.

Figure 6 is a similar section illustrating a second form and showing air spring units supporting the truck frame upon the equalizer and coil spring units supporting the bolster on the truck frame.

Figure 7 is a similar section illustrating a third form and reversing the spring arrangement of Figure 6 and utilizing coil spring units supporting the truck frame upon the equalizer and air spring units supporting the bolster upon the truck frame.

Figure 8 is a similar section illustrating a fourth form in which the frame supporting spring units and the bolster supporting spring units all consist of air springs.

Figure 9 corresponds generally to Figure 1 but illustrates a fifth form, in which the bolster is supported from the frame by swing hangers instead of by spring units.

Figure 10 is a side elevation of the structure shown in Figure 9.

Figure 11 is a vertical transverse section on line 11—11 of Figure 9.

Figure 12 corresponds to Figures 1 and 9, but illustrates a sixth form, in which the bolster is spring-supported directly on the equalizer.

Figure 13 is a side elevation of the truck shown in Figure 12.

Figure 14 is a vertical transverse section on line 14—14 of Figure 12.

Figure 15 is a similar section on line 15—15 of Figure 12.

Figure 16 is a horizontal section on line 16—16 of Figure 13.

Figure 17 is a detail top view of the mounting of one end of a brake beam upon the equalizer.

Figure 18 is a side view of the structure shown in Figure 17.

Figure 19 is a vertical section on line 19—19 of Figure 18.

The first form of the invention illustrated in Figures 1–5 embodies wheels 1, axles 2, journal boxes 3, and equalizers 4, resting directly upon the journal boxes and extending from one journal box to the other at the same side of the truck. Each equalizer, intermediate its ends, is provided with a spring seat 5 for a spring unit 6, here consisting of a coil compression spring. A rigid truck frame includes wheel pieces 7 and spaced transverse transoms 8, extending between and merging with wheel pieces 7. Each wheel piece includes a downwardly facing spring cap 9, positioned between transoms 8 and projecting transversely of the wheel piece and receiving the upper end of an equalizer spring 6.

A pair of brackets 10 extend outboard of wheel piece 7 fore and aft of spring cap 9 and forms seats for coil springs 11, positioned intermediate the corresponding equalizer spring 6 and the axles 2. A bolster 12 extends transversely of the truck between transoms 8 and has its end portions elevated and extending over wheel pieces 7 and bifurcated to form terminals 13 spaced apart longitudinally of the truck and resting upon springs 11. The bolster includes a central bearing, load-supporting portion 14 which extends lengthwise of the truck over the adjacent parts of transoms 8 and upon which a body vehicle center sill S is pivotally supported.

Between the spaced terminals 13 at each side of the truck, the bolster is provided with a downwardly extending arm 15, the lower end of which is below the level of the adjacent wheel piece 7. An anchoring device 16 has one end connected to the lower portion of arm 15 and its other end connected to a bracket 17 projecting from wheel piece 7. Anchor 16 is of a type in general use in railway truck structure, whereby two moving parts, clamped between rubber pads at the ends of an elongated rod, are held against relative movement lengthwise of the rod, but are permitted to angle relative to each other by the distortion of the pad about the rod axis. Accordingly, the truck bolster and truck frame may move vertically relative to each other with the compression of the bolster springs 11, but the bolster is held against movement lengthwise of the truck by anchor 16 and tilting of the bolster in a vertical longitudinal plane is resisted by the contact of the bearing surfaces on the central bearing 14 and the adjacent portion of the body underframe. Tilting of the frame in a vertical longitudinal plane is resisted by the longitudinally spaced springs 11.

The body load is equalized into the truck frame through the longitudinally extending end portions of the bolster. Springs 11, and the central spring support of the truck frame on the equalizer, are all of metal coils but may have different characteristics so as to avoid building up harmonic oscillations.

The second form of the invention illustrated in Figure 6 corresponds generally to that previously described but embodies a different spring arrangement, in which the truck frame has seats 20 for coil springs 21 which support the end caps 23 of the bolster 22 substantially as in the structure shown in Figures 1–5, but the truck frame is supported upon equalizers 24 through an air spring 26 disposed centrally of the equalizer and comprising a bellows-like flexible wall body with metal end caps received in the equalizer spring seat 25 and the truck frame wheel piece 27, respectively.

The third form of the invention illustrated in Figure 7 corresponds generally to those previously described but each of the truck frame seats 30 receives the lower end of an air spring 31 corresponding to the equalizer spring 26 just described and each of the bolster spring caps 33 receives the upper end of the air spring. The equalizer 34, and its seat 35, mounts a metal coil spring 36 substantially the same as that used in the truck shown in Figures 1–5 and similarly supporting the truck frame wheel piece 37.

The fourth form of the invention illustrated in Figure 8 embodies another spring arrangement, in which each of the bolster springs 41 and the equalizer springs 45 is of the air spring type and is received in the associated parts as previously indicated.

The fifth form of the invention illustrated in Figures 9, 10, and 11 retain the feature previously described of mounting the equalizer springs at the middle of the equalizers but there are no separate bolster supporting springs. In this structure, the wheels 51, axles 52, and journal boxes 53 are substantially the same as previously described. A double set of equalizer bars 54 are mounted upon journal boxes 53. A spring seat 55 is mounted upon the associated equalizers and extends a substantial distance inboard and outboard therefrom. A pair of spring units 56 are mounted on each seat 55 and are placed side by side transversely of the truck. The truck frame includes a wheel piece 57 and spaced transoms 58. The spring cap 59 on the wheel piece is widened transversely of the truck to fit over both sets of springs 56. The bolster 62 terminates in forked end portions 63 which extend between equalizers 54 and wheel piece 57 and are supported by swing hangers 64, pivoted brackets 65 projecting from wheel pieces 57. Chafing plates 66 are provided between bolster 62 and truck frame transoms 58. An upright snubber 67 is connected at its ends to spring seat supporting bracket 55 and spring cap bracket 59, respectively.

With this arrangement, the bolster load is transmitted substantially direct to the truck frame through hangers 64 and there are no bolster springs mounted on the truck frame.

In the sixth form of the invention illustrated in Figures 12–19, the wheels 71, axle 72, and journal boxes 73 are substantially the same as previously described. Each equalizer 74 consists of a casting with forked ends 74*a* supported upon the journal boxes and straddling the adjacent portion of the truck frame wheel piece 77. The equalizer spring seat 75 is pivotally mounted at 75*a* on the equalizer and extends inboard and outboard of the equalizer and its outboard portion is elongated lengthwise of the truck and the seat may tilt in a vertical plane extending lengthwise of the truck. The fore and aft end portions of spring seat 75 mount upright coil springs 76 which support the truck frame through frame brackets 80. Four upright coil springs 81 on spring seat 75 support the load-carrying bolster 82 directly from the equalizer and none of the bolster load is transmitted through the truck frame. The truck frame serves to hold the wheeled axles in spaced relation and the wheels in tram. Chafing plates 84 are provided between the sides of the bolster and truck frame transoms 78 and limit the movement of the bolster relative to the frame lengthwise of the truck.

In this form of the invention, each equalizer is provided with inboard brackets 85 (Figures 17, 18, 19) inclined from the horizontal lengthwise of the truck and slidably supporting the ends of brake beams 86 as they are moved to and from the wheel treads during application and release of the brakes. These brackets are abreast of the frame-supporting springs 76 and are fore and aft of the inboard bolster springs 81. The spring and brake support arrangement provides for the close coupling of the truck wheels notwithstanding the fore and aft arrangement of the bolster and frame supporting springs.

It is to be understood that in each form of the invention illustrated in Figures 9–19, any spring group may comprise a metallic spring or an air spring or a combination of metallic and air springs, as illustrated in Figures 5–8.

All of the trucks described disclose a spring arrangement transferring the entire truck load to the middle portion of the equalizers, whereby the load is completely equalized.

The bolster supports, whether individual bolster springs or swing hangers, are spaced apart longitudinally of the truck to provide increased stability, and the truck frame is supported, at least in part, outboard of the journal boxes, further contributing to the stability of the truck. The bolster supports are spaced, at least in part, transversely of the truck from the equalizer springs, thus contributing to the shortening of the wheel base.

The details of the structures may be varied substantially otherwise than as shown without departing from the spirit of the invention and the exclusive use of those modifications coming within the scope of the claims is contemplated.

What is claimed is:

1. A railway vehicle truck having spaced axles with wheels and journal boxes and an equalizer extending between and carried by the journal boxes on the same side of the truck, a rigid truck frame member holding the wheeled axles in predetermined spaced relation longitudinally of the truck, a relatively movable load-supporting bolster member, and spring means supported from the middle of each equalizer equidistant from the ends of the latter, said spring means forming the sole supports for said members on the equalizers.

2. A railway vehicle truck according to claim 1, in which elements support the bolster member at points spaced apart lengthwise of the truck fore and aft of the middle of the equalizer.

3. A railway truck structure according to claim 1, in which a portion of the spring means comprises an air spring and a portion comprises a metallic spring.

4. A railway truck structure according to claim 1, in which one of the members is supported by an air spring and the other of the members is supported by a helical spring.

5. A railway vehicle truck according to claim 1, in which spring units mounted on the truck frame member support the bolster member therefrom.

6. A railway vehicle truck according to claim 1, in which the spring means include a plurality of upright bolster spring units at each side of the truck positioned fore and aft of the middle of the equalizer.

7. In a railway vehicle truck, spaced axles with wheels and journal boxes, an equalizer extending between and supported upon boxes at each side of the truck, a truck frame member, a spring support for the truck frame member upon each equalizer near the middle thereof, a load-carrying bolster member, and supports for the bolster member on the truck frame member at points between the journal boxes and said frame member supports.

8. A railway vehicle truck according to claim 1, in which the bolster member supports comprise spring units mounted on the truck frame member.

9. A truck according to claim 1 which includes an

anchor device between the equalizer and the bolster member and holding them against relative movement lengthwise of the truck.

10. A railway vehicle truck having spaced axles with wheels and journal boxes and an equalizer extending between and carried by the journal boxes on the same side of the truck, a spring group mounted on the middle portion of each equalizer, a truck frame mounted on said spring groups, a spring group mounted on each side of the truck frame fore and aft of the corresponding equalizer-mounted group, and a load-carrying bolster mounted on the truck frame-mounted group, one spring group comprising air spring structure and the other spring group comprising metallic spring structure.

11. A railway vehicle truck according to claim 1, in which the bolster member supports comprise hangers suspended from the frame member and swinging transversely of the truck.

12. A railway vehicle truck according to claim 1, in which links pivotally suspended direct from the truck frame member to swing transversely of the truck are pivoted directly to and form the sole support for the bolster member.

13. In a railway truck having spaced axles with wheels and journal boxes and an equalizer extending between and carried by the journal boxes on the same side of the truck, spring structure at each side of the truck mounted on the equalizer intermediate its ends, a truck frame supported solely by said spring units, hangers suspended from the frame fore and aft of said spring structure to swing transversely of the truck, and a bolster having bifurcated ends straddling said spring units and suspended from the frame by said hangers.

14. A truck according to claim 1, in which the bolster member is mounted directly on the equalizer spring means.

15. A railway vehicle truck according to claim 1, in which the spring means comprise a plurality of units, some of which support the truck frame member only and others support the bolster member only.

16. A railway vehicle truck according to claim 1, in which a seat member supports the spring means and is pivoted on the equalizer to tilt longitudinally of the truck.

17. A railway vehicle truck according to claim 1, in which a seat member supports the spring means and is pivoted on the equalizer to tilt longitudinally of the truck, and the spring means comprises a plurality of spring units positioned side by side longitudinally of the truck, some of which units support the truck frame member only and other of which units support the bolster member only.

18. A railway vehicle truck according to claim 1, in which a seat member supports the spring means and is pivoted on the equalizer to tilt longitudinally of the truck, and the spring means comprises a plurality of spring groups, one spring group being positioned closely adjacent to the middle of the equalizer and supporting the bolster member only, and other spring groups are positioned fore and aft of the bolster member supporting springs and support the truck frame member only.

19. In a railway vehicle truck having wheels, axles, journal boxes, equalizers extending between and carried by the journal boxes at the same side of the truck, a frame holding the wheels, axles and journal boxes in spaced relation, springs supported from the equalizers near the middle of the truck, a bolster supported from said equalizer springs, brake beams between the equalizer springs and adjacent wheel treads, and slidably supported upon the equalizers.

20. In a railway vehicle truck having wheels, axles, journal boxes, equalizers extending between and carried by the journal boxes at the same side of the truck, springs supported from the equalizers near the middle of the truck, a truck frame mounted on the equalizer springs and including wheel pieces disposed outboard of the wheels, springs mounted on the wheel pieces outboard of the same, a transverse load-carrying bolster mounted on said wheel piece supported springs, transverse transoms between said wheel pieces, and positioned fore and aft of the bolster, and brake beams slidably supported on the equalizers beneath the transoms and positioned between the bolster and adjacent wheel treads.

21. A railway truck structure according to claim 1 in which the bolster includes a central bearing having a load-supporting portion extending lengthwise of the truck fore and aft of the equalizer spring means whereby tilting of the bolster in the longitudinal vertical plane of the truck is resisted.

References Cited in the file of this patent

UNITED STATES PATENTS

2,190,762	Anderson	Feb. 20, 1940
2,352,400	Nystrom et al.	June 27, 1944
2,492,337	Travilla	Dec. 27, 1949