Aug. 18, 1925. 1,550,307

T. ELLIOTT

RAILWAY CAR TRUCK

Filed May 2, 1924 4 Sheets-Sheet 1

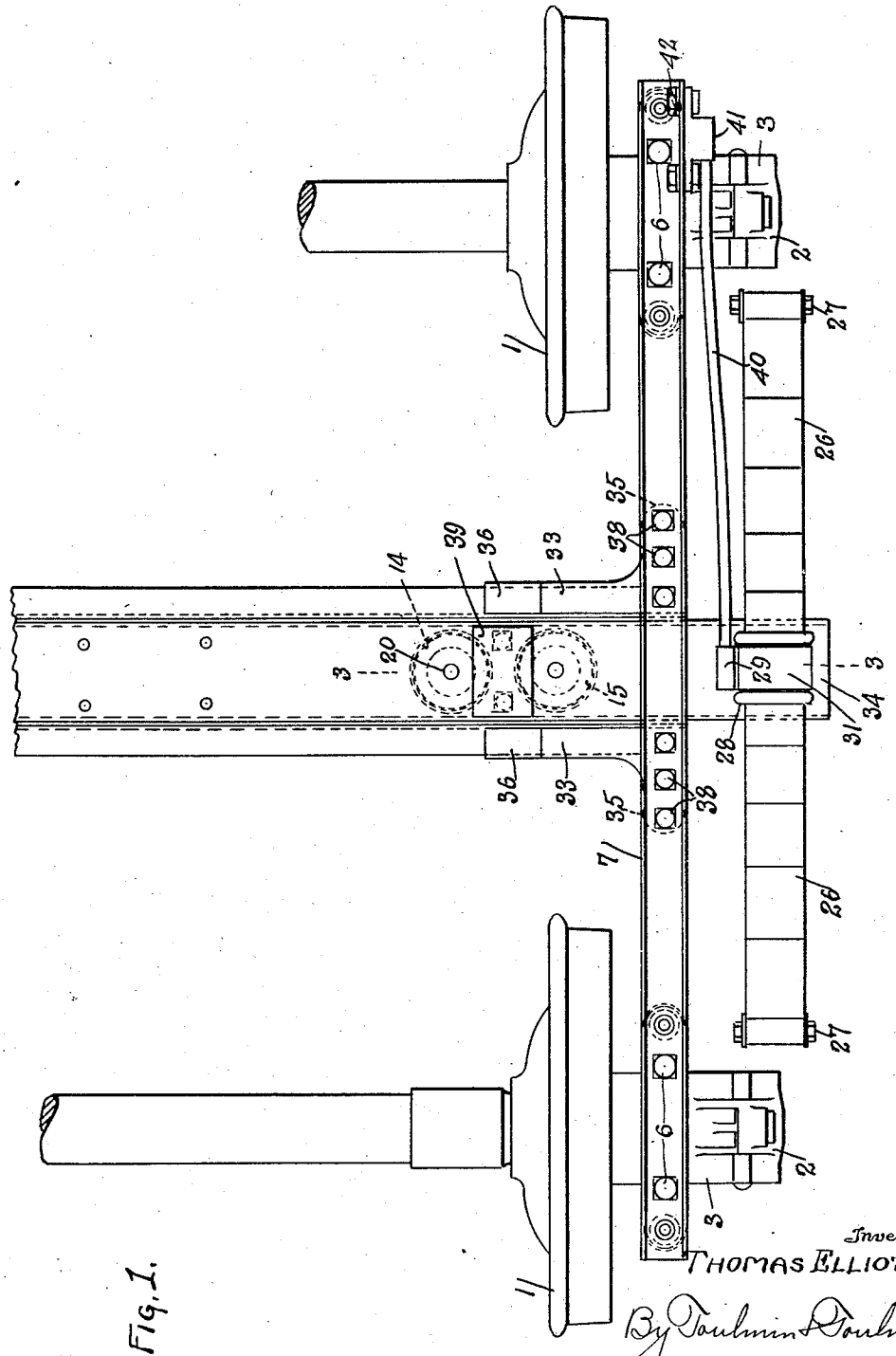


Fig. 1.

Inventor
THOMAS ELLIOTT,
By Coulmin & Coulmin,
Attorneys

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T. ELLIOTT

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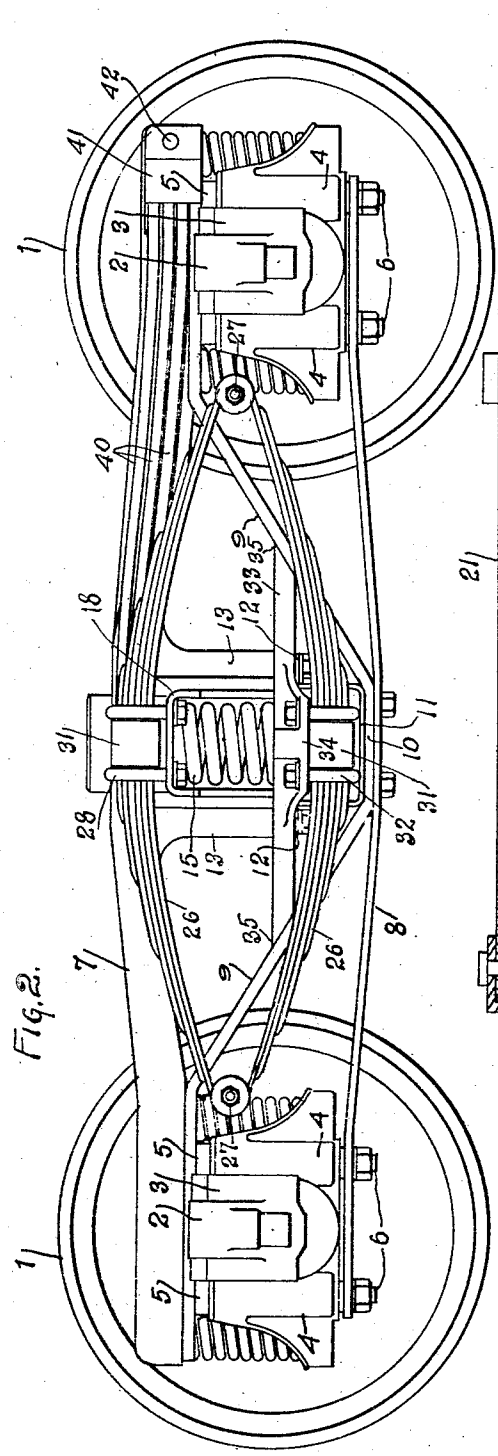


Fig. 2.

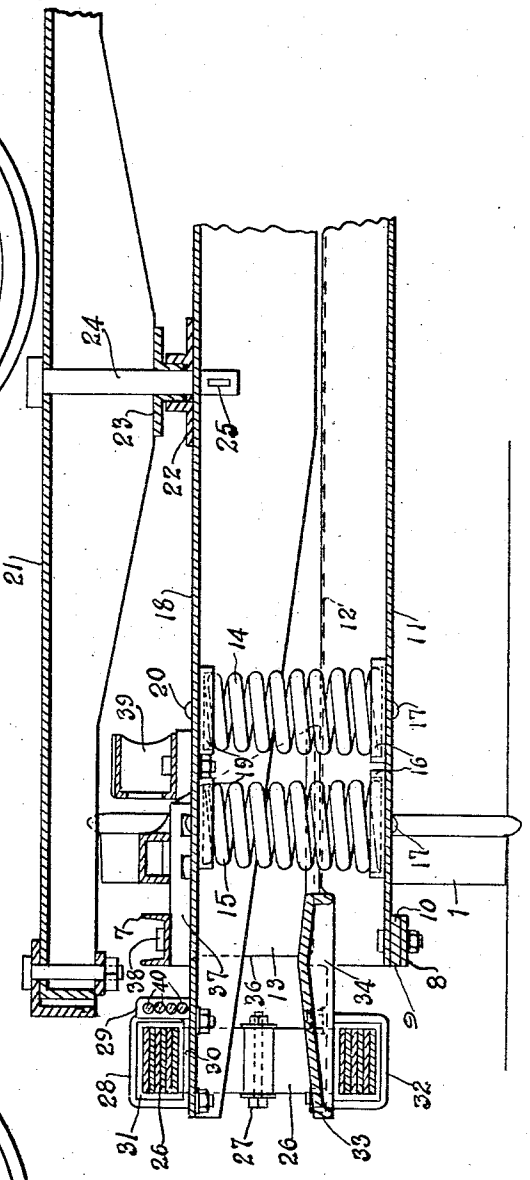


Fig. 3.

Inventor
THOMAS ELLIOTT,
By Toulmin & Toulmin,
Attorneys

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T. ELLIOTT

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Fig. 4.

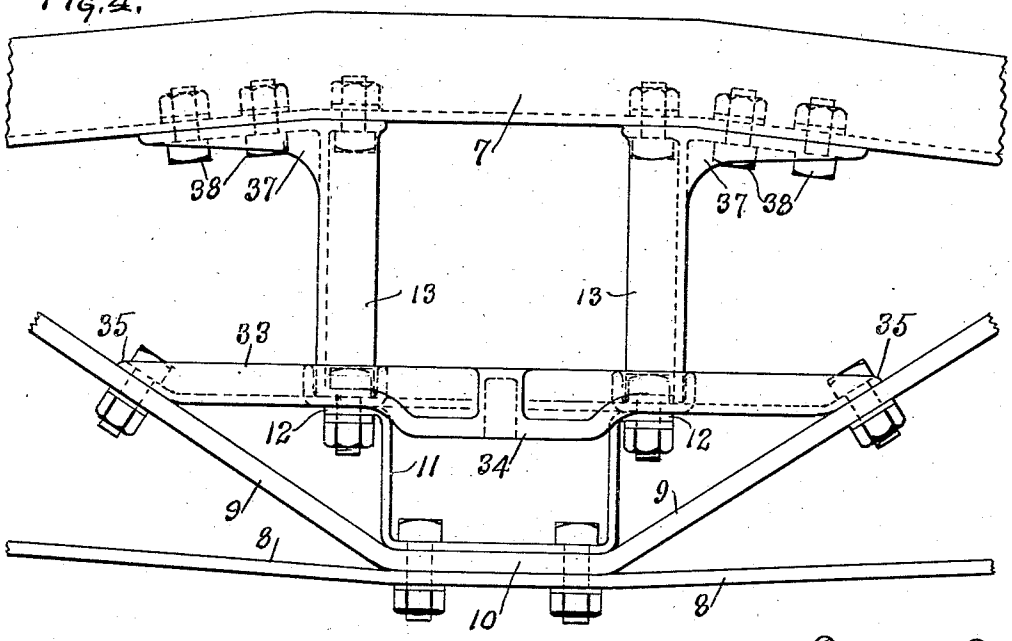


Fig. 5.

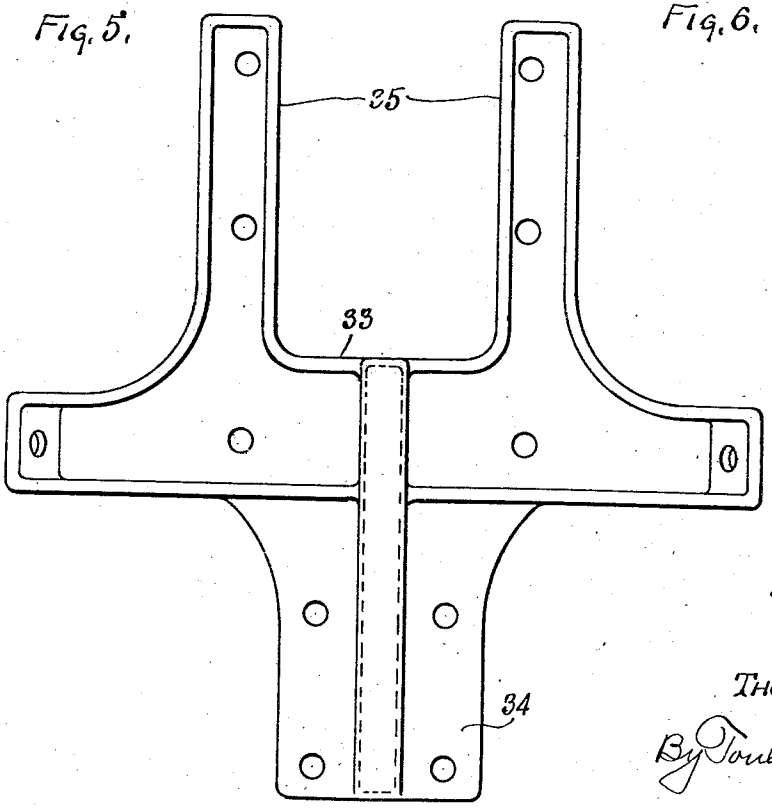
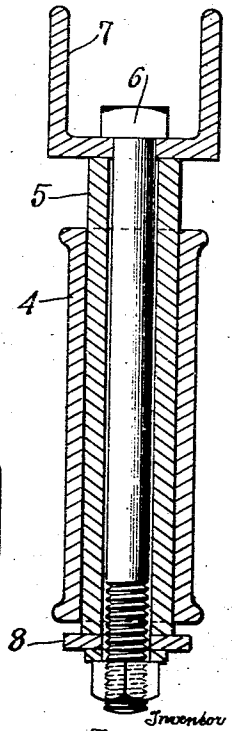


Fig. 6.



Inventor

THOMAS ELLIOTT,

By Toulmin & Toulmin,

Attorneys

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T. ELLIOTT

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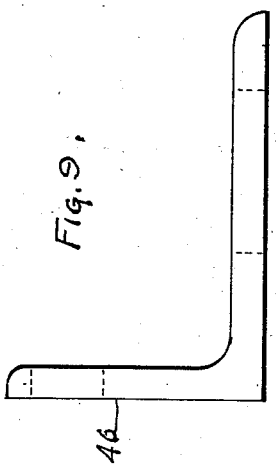


Fig. 9.

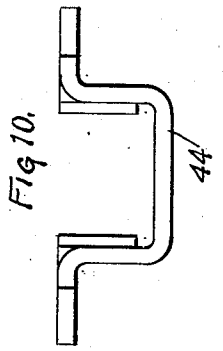


Fig. 10.

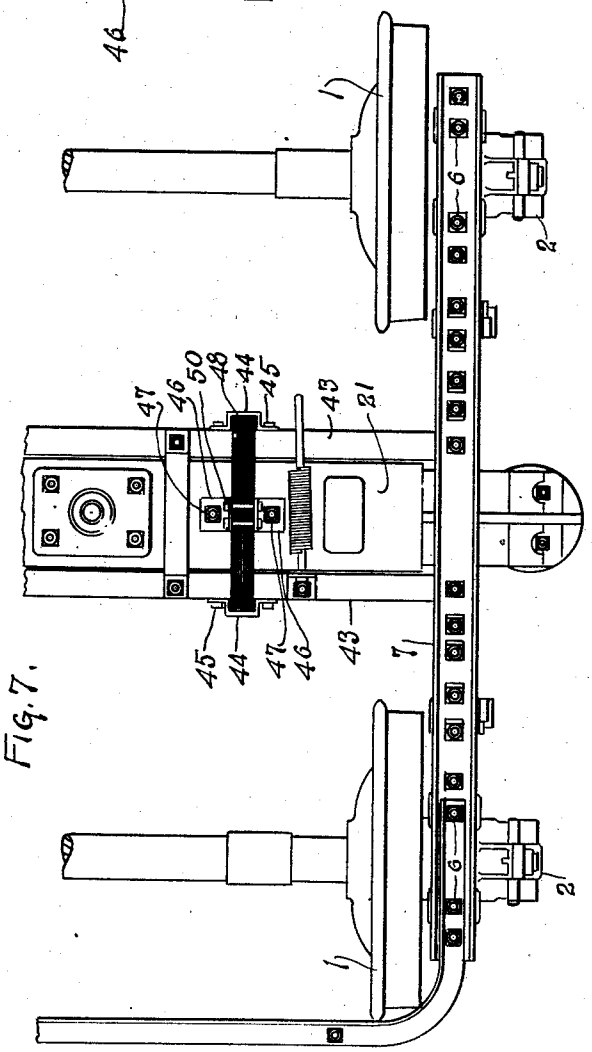


Fig. 7.

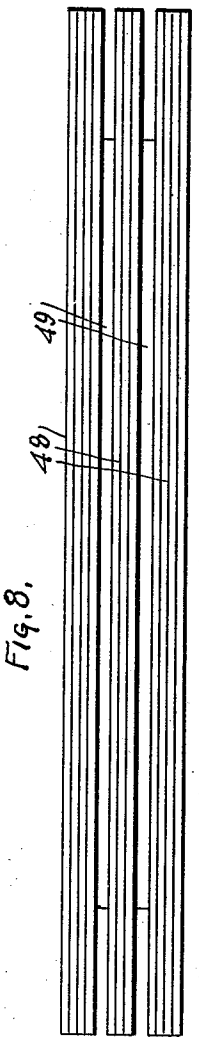


Fig. 8.

Inventor
Thomas Elliott,
By Toulmin & Toulmin,
Attorneys

Patented Aug. 18, 1925. 1,550,307

UNITED STATES PATENT OFFICE.

THOMAS ELLIOTT, OF CINCINNATI, OHIO, ASSIGNOR TO THE CINCINNATI CAR COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

RAILWAY-CAR TRUCK.

Application filed May 2, 1924. Serial No. 710,631.

To all whom it may concern:

Be it known that I, THOMAS ELLIOTT, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Railway-Car Trucks, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in railway car trucks, for use either on city and interurban railways or on steam lines, but more particularly the former.

I have a number of essential objects in view.

These objects are:—

First—To check the side thrusts or movements of the transverse truck bolster, which is pivoted to the car bolster, and which gets its lateral thrusts from the lateral movements of the car body. This object is carried into effect by means of helical springs mounted on the truck proper, as on the "spring plank" and connected to the truck bolster, whereby when the bolster receives a lateral thrust these springs will be deflected out of the vertical or bent over sidewise and will thus resist, gradually, these side thrusts of the bolster. It is further carried into effect by means of elliptical leaf springs, one division of which, say the upper division, is secured to the truck bolster so that when the bolster moves laterally it will tend to produce a torsional movement or twist of such section of the leaf springs, and thereby will be additionally resisted.

I have found that these helical springs and these leaf springs each, and both together, react against the side thrusts of the truck bolster effectively but gradually and thus so iron out or minimize these lateral thrusts as to relieve the car of the objectionable side jerks or movements which have long prevailed.

Second—To hold the truck bolster against movements longitudinally of the truck when longitudinal thrusts are imparted to the bolster as the trucks start into motion or as the speed is suddenly checked.

This object I carry into effect by means of a series of radius rods anchored at one end to the truck bolster and at the other end to the truck frame so that if the longitudinal movement of the truck bolster is in one direction a tensile strain is put upon these radius rods, and if in the other direction a column resistance is offered by the radius rods, whereby in either case the truck bolster is prevented movement back and forth longitudinally of the truck.

These radius rods are also adapted to sufficiently flex as to permit the free up and down motions of the bolster due to the yielding of the supporting springs as the truck rolls over the rails.

Again, these radius bars eliminate the use of the old transverse transom bars which trucks heretofore have carried, one forward and the other rearward of the truck bolster to resist the fore and aft movements of the bolster, a construction which was objectionable due to the rapid wearing of these transom bars which were usually made of wood.

Third—To so secure the ends of the coiled springs used in this truck, as also to so secure the leaf springs to the truck structure, as that no relative movements shall take place between such connections and the truck, but only the flexing movements of the springs whereby all wear in the connections between the springs and the truck structure, which would result from relative movements between them, is eliminated.

In the accompanying drawings forming a part of this specification, Figure 1 is a plan view of substantially one-half of my improved truck in which the helical springs are shown in dotted lines and the leaf springs and the radius rods in full lines.

Figure 2 is a side elevation of my improved truck, in which clearly appear one of the helical springs, one of the leaf springs, and a set of radius rods, which are features that enter vitally into the invention.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1, and showing the leaf springs in cross section, the helical springs in side elevation and the spring plank and truck bolster in section, as also the body bolster.

Figure 4 is a detail enlarged side elevation showing the upper arch bar, the struts and the spring plank.

Figure 5 is a plan view of the leaf spring supporting bracket.

Figure 6 is a sectional view showing the

upper arch bar, the spacing sleeve, the column post, the journal box and the bottom arch bar, which parts enter into the support for the wheel journal bearing.

Figure 7 is a plan view of a portion of a truck, illustrating a further feature, namely, a spring arrangement which acts to check or prevent lateral thrusts or movements of the bolster relative to the truck.

Figure 8 is a plan view of the spring used for this purpose.

Figure 9 is a detail side elevation of one of the angle brackets used to connect such spring with the truck bolster; and

Figure 10 is a detail enlarged plan view of one of the U-shaped brackets for connecting such spring with the transom of the truck.

I shall first refer to the general features of railway trucks to indicate the structure to which my improvements are applied. The numeral 1 designates the usual car wheels, whose projecting axles or spindles are mounted in journal boxes, indicated at 2. These boxes consist of a casting with the usual housing 3 for the journal bearing blocks, and, in this instance, with collars 4 mounted on spacing sleeves 5 secured by column bolts 6 to the upper arch bar 7 and the tie rod 8. This description applies to all four of the journal boxes.

It will be observed that the collars will ride up and down on the spacing sleeves when the spring equipment, hereinafter described, yields during travel.

The upper arch bar 7, of which there are two, one on either side, spans the distance between the journal bearings, while the tie rod 8 likewise extends from journal box to journal box.

A third member of this frame work is composed of the lower arch bar 9 whose lower middle portion, shown at 10, is secured to the tie rod and whose ends tend to overlie and are supported by the journal box, being located between it and the upper arch bar 7. This frame structure here described is of itself not novel, aside from the special feature just described with reference to the journal box and its mountings, which latter I regard as novel.

The numeral 11 designates what is termed the spring plank, which is a transverse beam in cross section preferably similar to the letter U as shown in Figure 2. This beam extends from side to side of the truck and at its ends rests upon the portion 10 of the lower arch bar 9 which in turn is further sustained by the tie rod 8. The upper edges of the spring plank are turned outward to form flanges 12 which with the supporting bracket 33 intervening are bolted to the strut posts 13 which are constituted of a cast frame which fits under the upper arch bars to brace them. Thus these struts are supported by the spring plank and in turn, as stated, act to sustain the middle portions of the upper arch bars.

Mounted upon the spring plank are helical springs 14 and 15, in the present instance four springs in all, two at either side of the truck as indicated in Figure 3 where two of the helical springs are shown located near one side of the truck. The foot of each spring is fitted firmly in a seat 16, in the nature of a cup, secured firmly to the bottom of the spring plank, as indicated by rivets 17. This seats the springs firmly on the spring plank and prevents all motions of them save their up and down and sidewise flexing, with the result that no wear is caused between the springs and the spring plank.

Above the spring plank is located the truck bolster designated 18 which is preferably formed of sheet steel and bent in cross section to substantially the form of the letter U inverted. This bolster, in a sense, floats within the truck and above the spring plank because its only connection with the truck is through the helical springs above referred to and through the leaf springs to be presently mentioned.

The upper ends of the helical springs 14 and 15 are seated in other seats 19, similar to seats 16, and secured as by rivets 20 to the upper part of the truck bolster, as clearly shown in Figure 3. The fitting of the upper ends of the springs snugly in these seats 19 again eliminates relative motion between the springs and the bolster to avoid wear. It will be noted also that as these seats envelope respectively the ends of the springs they form such a connection between the upper ends of the springs and the bolster 18, for instance, as that any lateral or transverse movements of the bolster 18 will be transmitted to the upper ends of the springs, whereby the springs will be deflected laterally. Their natural resistance to such deflection causes them to separate in the performance of the important function of yieldingly resisting and ultimately checking all lateral motions of the truck bolster. This carries out one of the objects stated at the opening of this specification. Again, the recoil or tendency of these helical springs to return to the vertical causes the bolster to quickly return to its normal position after it has suffered a strain or movement which has caused it to move laterally.

These lateral movements of the floating bolster are caused by the lateral swaying of the car body which is mounted on the car bolster, indicated at 21, and more clearly seen in Figure 3. The connection between the car bolster and the truck bolster I prefer to make of the form indicated in which a socket plate 22 secured to the car bolster

receives a hollow stud shaft 23 secured to the car bolster, with a king-bolt 24 mounted in the car bolster passing through the stud shaft and thence through the upper plate of the truck bolster and secured against dislodgment by a cotter pin 25 or other convenient device.

This king-bolt connection between the two bolsters secures the car body to the truck but permits freedom of the truck to swing with respect to the body when traveling over curved sections of the track. But because of this interconnection of the two bolsters it will be understood that the lateral thrust the car body receives as from centrifugal force while traveling on curves, or through irregularities of the road bed which would tend to cause the body to jerk from side to side, will all be taken up, resisted and ultimately checked by the reacting side thrusts of the truck bolster which are resisted by the helical springs in the manner before pointed out.

A further spring connection between the truck bolster and the truck itself, and a further spring action to check the side thrusts of the truck bolster, is obtained through the leaf springs indicated at 26. These springs are of the usual elliptic leaf spring type, with the upper half pivotally connected with the lower half by the usual eyes and bolts indicated in the drawings at 27. The position and mounting of these leaf springs in my organization are peculiar. Their position is at or near the outer ends of the truck bolster 18, as best seen in Figure 3, where the upper half is shown secured to such bolster by the conventional U bolt 28 and nuts with a bracket 29 having a shank 30 bound between the spring collar 31 and the bolster, this bracket being for a purpose presently to appear.

The lower half of this spring is secured by a similar conventional U bolt 32 to a supporting bracket 33. This bracket is composed of a lower member 34 and extended fore and aft in the form of arms 35 adapted to be secured to and sustained by the lower arch bar 9, and of vertical wings 36 which extend up alongside of the truck bolster and terminate in a cross portion 37 which is secured to the upper arch bar 7, as by bolts 38.

These brackets are thus very firmly and securely sustained and made efficient for supporting the leaf springs, so that the truck bolster is further supported in a yielding manner in addition to the support afforded by the helical springs. As stated earlier in this specification, side movements of the truck bolster are resisted by torsional strains applied to the upper half of the leaf springs. These torsional strains on the spring are due to the connection between the upper half and this bolster, so that when the latter moves sidewise it, through the U bolt connection, tends to give the spring a torsional twist, the resistance of which by the spring tends to check the bolster.

The usual side bearings, shown at 39, are adapted to limit the rocking motion of the car bolster.

Referring now to the means for preventing the floating truck bolster 18 from tending to surge forward or backward when the car is being stopped or started, it will be seen that I provide a series of radius rods 40, preferably four rods for each set, with one set adjacent each upper arch bar. These rods are secured at one end in the brackets 29 and are embedded in the other end in a clip 41 which is secured to the upper arch bar 7 as by bolts 42.

In this way the truck bolster is anchored to the truck frame against relative fore and aft movements of the bolster, yet without interference with the up and down vibrations of the bolster as the radius rods bend or flex sufficiently to permit of these vibrations without interference. Therefore, I have anchored the truck beam to the truck frame in fore and aft directions but left the bolster free to ride up and down on the supporting springs. When the bolster tends to surge in one direction it is resisted by tensile strains on the radius rods and when it tends to move in the opposite direction it is opposed by the column resistance of the rods, while its up and down motions are permitted by the flexing of the rods. The rods also flex laterally when the truck bolster undergoes lateral thrusts.

Thus the truck bolster, with its incumbent car bolster and car body is left to float on the helical and leaf springs, which act to check its lateral thrusts and is held against fore and aft thrusts through the medium of the radius rods, while the latter do not interfere with the up and down vibrations of the bolster.

I regard myself as the first to devise a structure in a car truck in which the truck bolster is a floating element combined with springs which sustain it and its load and which springs act also to check and resist all lateral thrusts of such bolster.

I also regard myself as the first to combine with a truck and its bolsters devices in the nature of radius rods which perform the important function of preventing the bolster from fore and aft movements relative to the truck, but which do not interfere with the other movements the bolster must undergo.

Referring now to another feature of my invention, namely the spring arrangement to check or prevent the car bolster 21 from movement laterally relative to the rest of the truck, due to side thrusts of the car body or of the truck proper, I call attention to Figures 7, 8, 9 and 10. In Figure 7 the

transoms 43, which are connected up with the rest of the truck in the usual, conventional way, are equipped with U-shaped brackets 44 secured thereto by bolts 45, while the floating bolster 21 is equipped with angle brackets 46 secured thereto by nuts and bolts 47. A spring 48, composed of a series of separate leaves as shown more clearly in Figure 8, and of intervening strips of wood 49, is secured between these angle brackets by means of bolts 50 which act to clamp the brackets against the spring, while the ends of the springs fit within the U-shaped brackets 44. These lateral brackets are of dimensions vertically sufficient to retain the springs during all of the up and down movements incident to the traveling of the truck over the rails.

It will now be seen that any movement of the bolster relative to the transoms of the truck, or of the latter relative to the former, will exert a flexing pressure on the spring 48, and that the spring will resist the tendency to such movements. In other words, this spring operates to check or prevent the bolster from moving laterally with respect to the truck. And yet this is done in a yielding and accommodating way so as not to cause breakage. And the harder the lateral thrust, the more the spring will be deflected and the greater its deflection, the greater will be the resistance to the movement.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a truck, the combination with a truck bolster, of helical springs secured to the truck structure and to such bolster, and adapted to yield vertically and to flex or bend laterally to permit, but resist and check vertical and lateral movements of the bolster.

2. In a truck, the combination with a truck bolster, of helical springs secured to the truck structure and to such bolster, and adapted to yield vertically and to flex or bend laterally to permit, but resist and check vertical and lateral movements of the bolster, and leaf springs connected with the bolster and with the truck structure and adapted to flex when the bolster moves vertically and to act torsionally when the bolster undergoes lateral movements.

3. In a truck, the combination with a truck proper having a spring plank, of helical springs mounted on said plank and a bolster connected to the truck by these springs and supported thereby, the springs permitting but resisting up and down and lateral movements of the bolster.

4. In a truck, the combination with a truck proper having a spring plank, of helical springs mounted on said plank, a bolster connected to the truck by these springs and supported thereby, the springs permitting but resisting up and down and lateral movements of the bolster, and leaf springs whose lower members are secured to the truck structure and whose upper members are secured to said bolster and which yield vertically to up and down movements of the bolster and yield torsionally to lateral thrusts of the bolster.

5. In a truck, the combination with a bolster, of radius rods secured at one end to the bolster and at the other end to the truck, and adapted to flex up and down, whereby the vertical movements of the bolster are permitted but fore and aft movements of the bolster relative to the truck are prevented by the radius rods.

6. In a truck, the combination with a bolster, of a series of substantially horizontal radius rods each connected at one end to the bolster and at the other end to the truck and each adapted to flex to permit up and down movements of the bolster and each also adapted to act through tensile strains to check the lengthwise movement of the bolster in one direction and through column resistance to check such movement of the bolster in the other longitudinal direction.

7. In a truck, the combination with its bolster, of helical springs secured to the bolster and to the truck and radius rods secured to the bolster and to the truck, whereby through the springs the up and down and lateral movements of the bolster are checked and through the rods the longitudinal movements of the bolster are resisted.

8. In a truck, the combination with its bolster, of helical springs and leaf springs secured to the truck and to the bolster, and radius rods secured to the bolster and to the truck, whereby the up and down and lateral movements of the bolster are resisted by such springs and whereby the fore and aft movements of the bolster relative to the truck are resisted by the rods.

9. In a truck, the combination with a truck proper including a spring plank, of a floating bolster and spring connections between such plank and such bolster which are put under tension when the bolster receives side thrusts, whereby such thrusts are yieldingly checked.

10. In a truck, the combination with a fixed portion thereof, of a floating bolster capable of unobstructed movement longitudinal of itself and relative to said fixed portion of the truck, and helical springs secured firmly to such portion and to the bolster and themselves adapted to limit such longitudinal movement of the bolster.

11. In a truck, the combination with a spring plank and a floating bolster, such bolster having unobstructed longitudinal

movement relative to the plank, each having spring seats secured thereto, of helical springs fitted at their ends in said seats and adapted to limit such longitudinal movement of the bolster.

12. In a truck, the combination of a spring-supporting bracket and a floating bolster, of an elliptical spring having one part secured to such bracket and the other part to such bolster, whereby the bolster is supported vertically and checked laterally.

13. In a truck, the combination with a spring plank and an inclined lower arch bar, of a spring-supporting bracket secured to said plank and lower arch bar, a bolster, and an elliptic spring, one branch being secured to said bracket and the other to said bolster.

14. In a truck, the combination with a spring plank, an upper bar, an inclined lower arch bar, and a bracket secured to said plank, bar and lower arch bar, of a bolster and an elliptical spring one branch of such spring being secured to said bracket and the other to said bolster.

15. In a truck, the combination with a truck proper having transoms, of a bolster adapted to carry a car body, and a spring connected with such bolster and the transoms to resist lateral movements of the bolster.

16. In a truck, the combination with a truck, having transoms, of a bolster and a spring secured thereto and connected with the transoms and adapted to flex when lateral movements are imparted to the bolster and to resist such movements.

17. In a truck, the combination with a truck proper having transoms, of a bolster and a leaf spring composed of a series of leaves set edgewise on the bolster and transoms, secured to the bolster and connected to the transoms by brackets which permit the spring to rise and fall, but resist lateral movements of the ends of the springs, whereby the bolster is checked against lateral thrusts.

18. In a truck, the combination with a bolster of a leaf spring comprising a series of leaves, with a filling between the groups of the leaves to separate them and to stiffen the body portion of the spring.

In testimony whereof, I affix my signature.

THOMAS ELLIOTT.