

May 26, 1942.

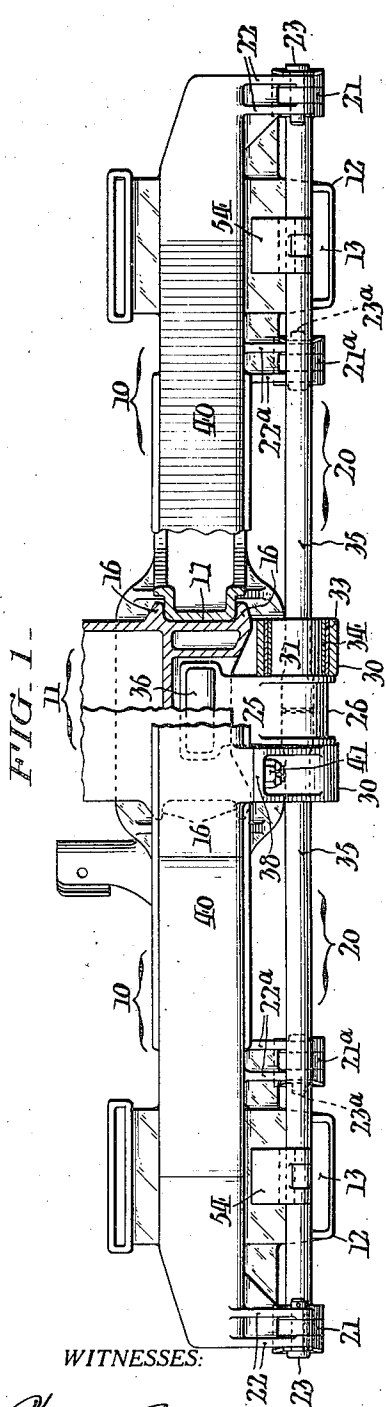
I. M. CHAMBERS

2,283,971

SPRINGING FOR RAILWAY TRUCKS

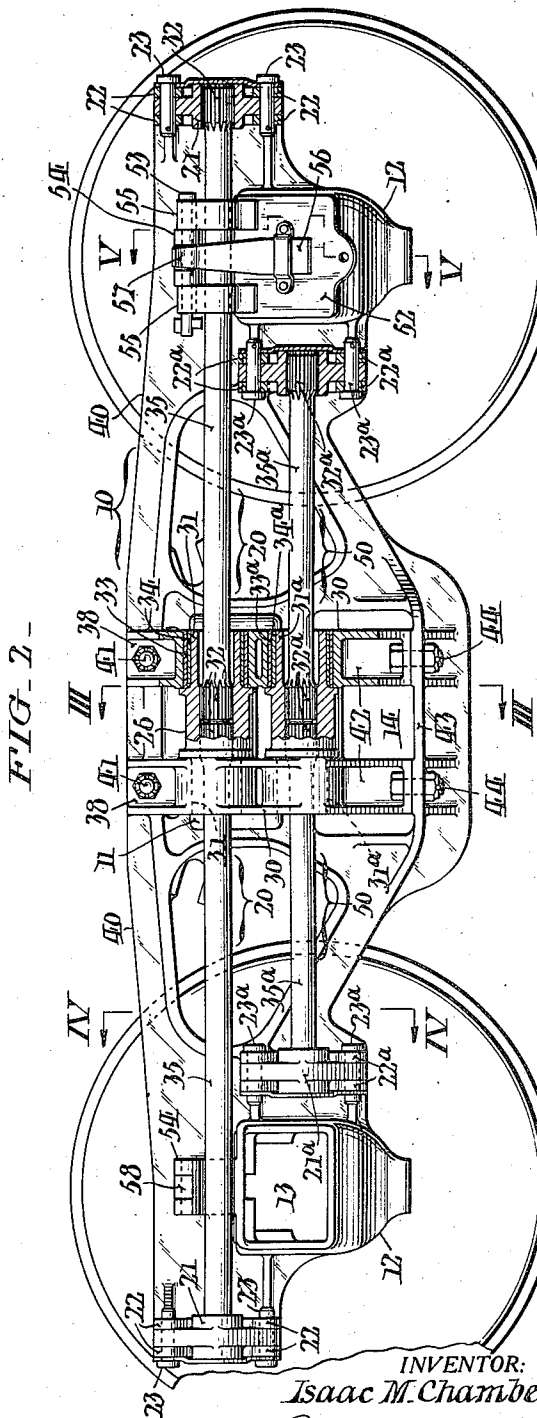
Filed Feb. 27, 1940

3 Sheets-Sheet 1



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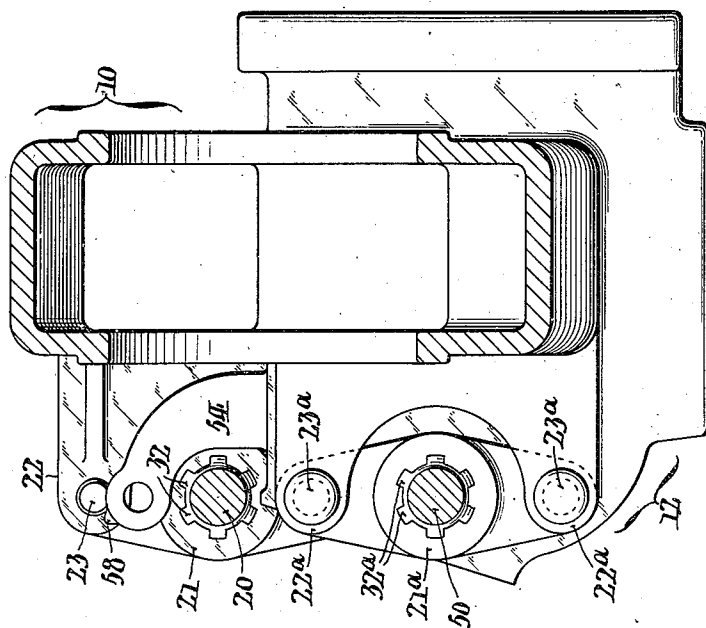
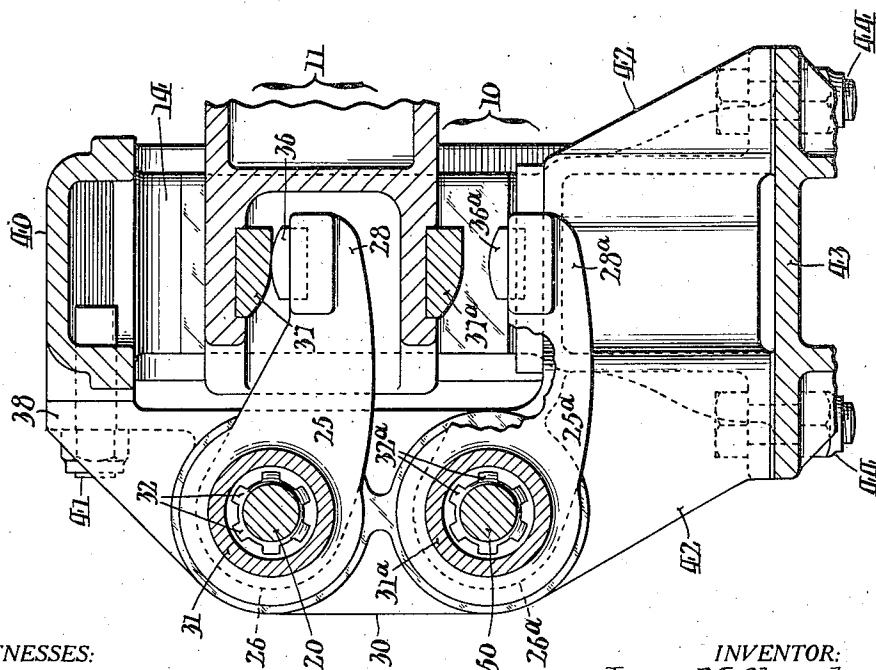
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SPRINGING FOR RAILWAY TRUCKS

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3 Sheets-Sheet 2



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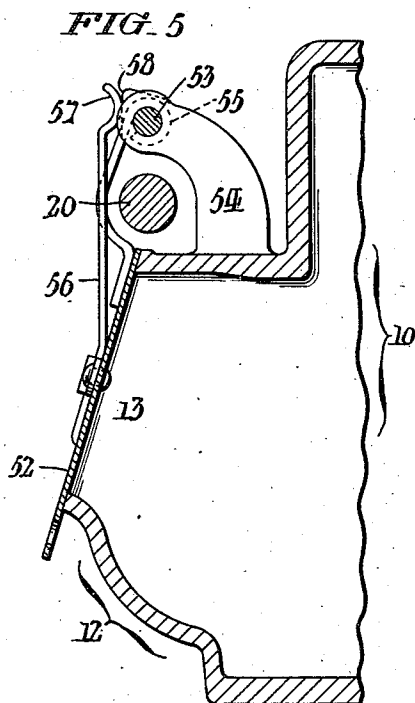
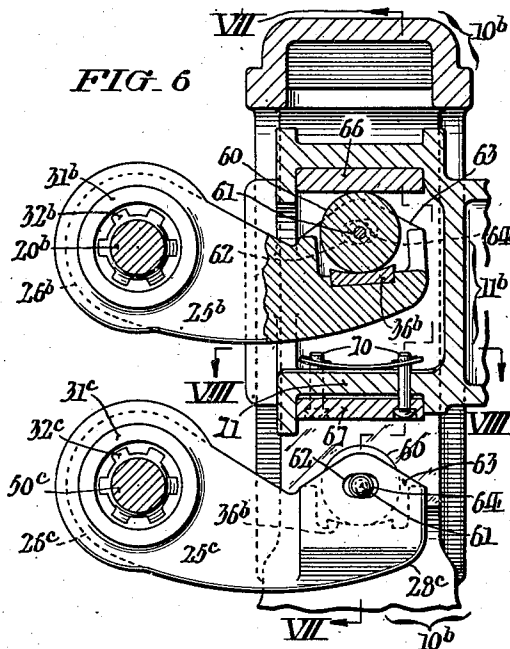
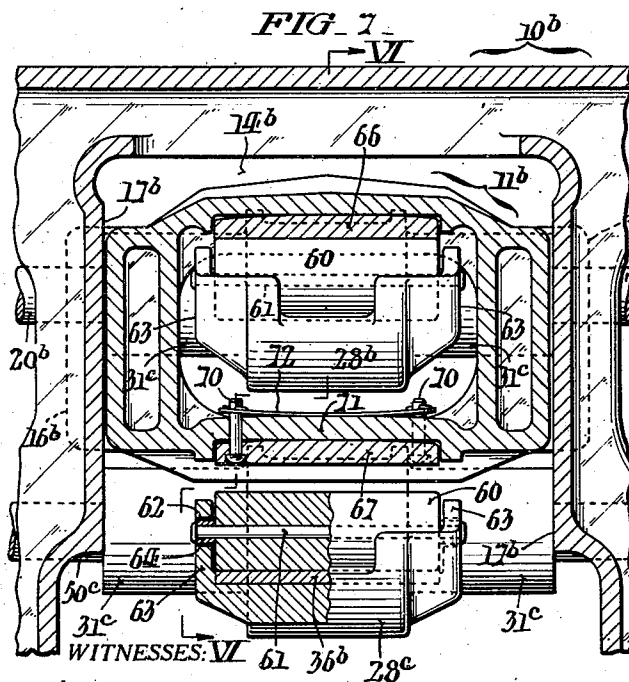
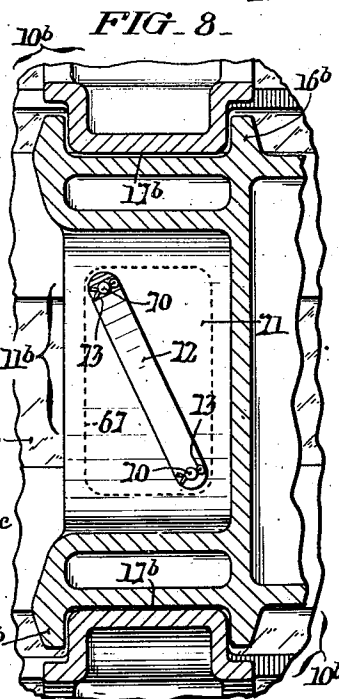
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SPRINGING FOR RAILWAY TRUCKS

Filed Feb. 27, 1940

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,283,971

SPRINGING FOR RAILWAY TRUCKS

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Application February 27, 1940, Serial No. 321,009

16 Claims. (Cl. 105—197)

This invention relates to railway trucks and the like, and especially to springing suitable for bolster type trucks. An important aim of the invention is to provide a wider range of elasticity without necessity for making trucks larger than usual. The invention permits of a soft, yielding spring action for light loads, combined with a stiffer action for heavy or maximum loads. In suitable forms of embodiment, the invention allows of easy adjustment or replacement to take care of wear. The spring rigging can be made simple and rugged, and especially accessible for inspection or repair. Other features and advantages of the invention will appear from the following description of species or forms of embodiment, and from the drawings. All the features and combinations illustrated or described are of my invention, so far as novel.

In the drawings, Fig. 1 is a plan view of one side of a railway truck conveniently embodying the invention, including the corresponding side frame and bolster end, certain parts being partly broken away or in section; Fig. 2 is a side view of the truck, certain parts being partly broken away; Fig. 3 shows a transverse section through the truck, taken as indicated by the line and arrows III—III in Fig. 2, on a larger scale and with one of the parts partly broken away; Fig. 4 shows a transverse section taken as indicated by the line and arrows IV—IV in Fig. 2; and Fig. 5 shows a section taken as indicated by the line and arrows V—V in Fig. 2.

Fig. 6 is a fragmentary transverse section corresponding to Fig. 3, but taken as indicated by the line and arrows VI—VI in Fig. 7 (omitting certain parts), and illustrating a modification; Fig. 7 shows a fragmentary longitudinal section through the side frame, taken as indicated by the line and arrows VII—VII in Fig. 6; and Fig. 8 shows a horizontal section through the side frame and bolster, taken as indicated by the line and arrows VIII—VIII in Fig. 6.

The drawings show only one side of the truck, since the other side may be just like that illustrated. Accordingly, there is shown in Figs. 1 and 2 a side frame 10, resembling those of present standard freight car trucks in general design and construction, with one end of a transverse bolster 11 that carries the load of the car body, as usual. Besides the usual axle-box jaws or housing 12 with openings 13, the side frame 10 is shown as having the window opening 14, in the upper part of which the end of the bolster 11 is engaged and guided for up and down movement relative to the frame. As shown in Fig. 1, 55

the bolster end has vertical stop flanges 16, 16 which engage and coast with the usual guideways 17, 17 at opposite sides of the window opening 14 to determine the longitudinal position of the bolster 11 in the window 14, and to keep the side frame 10 truly upright.

Instead of helical springs or elliptic type leaf-springs arranged in the window openings 14 under the ends of the bolster 11, as is usual, I employ torsional springs 20 whose size and capacity need not be limited by the restricted dimensions of the window-space. Such torsion springs 20 may be arranged lengthwise of the truck alongside the side-frames 10, preferably at the outer side of the latter, as illustrated in Figs. 1 and 2. With this arrangement, springs 20 in the form of simple torsion bars or rods afford ample strength and elasticity, since the whole length of the side frame 10 is available to accommodate and mount them.

As shown in Fig. 1, the spring 20 consists of a long torsion member having its ends anchored to the ends of the side-frame 10 outside of or beyond the axle-box housings 12, 12, as by means of cross heads 21 each of whose arms extends between lugs 22, 22 on the corresponding end of the side-frame 10 and is secured thereto by means such as a pin 23, while the mid-portion of the member 20 is connected to the end of the bolster 11, at, in, or through the window 14. For this purpose, there is shown in Figs. 2 and 3 a crank-arm 25 whose hub 26 surrounds and is keyed to the mid-portion of the torsion member 20, and whose free end 28 engages under or in the end of the bolster 11. Thus the two ends of the torsion member 20 are oppositely twisted under the load of the bolster 11. Bearing may be provided on the side-frame 10 for sustaining the mid-portion of the torsion member 20 against deflecting downward under the bolster load, as by means of bearing brackets 30, 30 projecting outward from the frame at either side of the crank-arm 25. For this purpose, as shown in Fig. 2, the crank-arm hub 26 has (hollow) trunnions 31, 31 journaled in the bearing brackets 30, 30. In the present instance, the anti-turning or torque-transmitting connection of the member 20 to the crank 25 is made directly to the crank-hub 26, by means of splines 32 on an enlarged portion of the member 20, which engage in corresponding internal keyways or grooves inside the hub, so that the crank trunnions 31, 31 do not transmit the torque at all, but merely serve to sustain the middle of the member 20. As shown in Fig. 4, the outer ends

of the torsion member 20 have similar anti-turning connection into the hubs of the cross-heads 21. Preferably, the bearing brackets 30, 30 have readily renewable internal bearings in the form of bushings or wearing liners 33, and the trunnions have corresponding renewable external wearing sleeves 34.

For convenience in construction and assembly, the torsion-spring member 20 is preferably divided into sections 35, 35 as indicated in Fig. 2: however, these sections 35, 35 are coupled together so as to be practically one member by their anti-turning engagement in the hub 26. The internal bores of the trunnions 31, 31 are preferably large enough to clear the splines on the ends of the torsion-rod sections 35, 35 easily when the parts are assembled or disassembled. As shown in Figs. 1 and 3, the crank arm 25 has a renewable wear-block 36, cylindrically rounded about an axis fore and aft of the truck, and the end of the bolster 11 has a coacting renewable wear-block 37, somewhat similarly rounded. As shown in Figs. 2 and 3, each of the bearing brackets 30 has an upper foot portion 38 that bears against a corresponding pad on the top member 40 of the side frame 10, and is bolted thereto at 41, and also has a lower base portion 42 that extends into the bolster window 14 and is bolted to the bottom member 43 of the frame 10 at 44, 44.

In the present instance, there is an additional torsion spring member 50 alongside the side frame 10, below the member 20, which also serves for resiliently sustaining the bolster 11. The ends of this member 50 may be anchored to the side frame 10 inside of or between the axle-box jaws or housings 12, 12; instead of beyond them as in the case of the member 20. Otherwise, the anchorages and other features pertaining to these rods 50 are the same as described for the rods 20, and are marked with the same reference numerals, with the addition of a distinctive letter. The torsion members 50 act in parallel with the members 20 in sustaining the load of the bolster 11. As shown in Fig. 3, however, the torsion members 50 do not come into action concurrently with the members 20, i. e., under the lighter loads, but only under comparatively heavy loads. Thus the spring 50 and its crank 24a have a resilient buffer action when the spring 20 yields sufficiently to let the bolster block 37a engage the crank-arm block 36a. Hence when the bolster 11 is in its position of partial downward deflection under a light load, as in Fig. 3, and the member 20 is correspondingly stressed through the arm 25, the bearing blocks 36a and 37a that pertain to the arm 25a and to the member 50 are not yet in contact with one another. Thus when the load on the bolster 11 is light, it is sustained by the spring 20 alone, which yields sufficiently to give easy riding; while when the load on the bolster 11 is heavy, it is cumulatively sustained by the spring 50 acting in parallel with the spring 20, so that a stiffer resistance is offered, to prevent excessive deflection. Moreover, the spring 50 may itself be made stiffer than the spring 20, if desired, so as to offer greater resistance in proportion to the deflection it undergoes. Or, again, the spring 20 might be stiffer than the spring 50.

As shown in Figs. 2 and 5, the torsion member 20 extends along just above the axle box housings 12, 12, where it would interfere with opening the housing lids 52 if the latter were hinged at the top of the housings in the usual manner: 75

indeed, this member 20 really leaves no room for the usual lid hinges. I have obviated this difficulty, however, by locating each hinge pivot 53 above the housing 12 (Figs. 2 and 5) on a bracket 54 projecting (upward and forward, Figs. 4 and 5) from the frame 10, or, properly speaking, from the top of its housing portion, and providing the lid 52 with hinge straps 55 at either side of the bracket 54. As shown, the lid is also provided with a stop-spring 56 whose curved upper free end 57 wipes past a projecting corner or ridge 58 on the hinge bracket 54 when the lid is opened or closed, and thus serves to hold the lid either tight shut or wide open.

As will be apparent from Fig. 3, changing the blocks 36, 37 and 36a, 37a offers an easy means of adjusting the relative action of the springs 20 and 50, so that they shall either act concurrently or successively, in any desired sequential relation to one another. Indeed the spring 20 might readily be made to come into action after the spring 50, if this were desired for any reason. Changing these blocks 36, 37 and 36a, 37a also affords a convenient means of adjusting coupler height for wheel and axle bearing wear. The profiles of the blocks 36, 37 and 36a, 37a can be designed to compensate for the angular shift of the crank arms 25, 25a, so as to maintain the leverage on the spring members 20, 50 substantially constant. Moreover, the spring rates of deflection can readily be changed by changing the spring bar sections. Or one of the spring bar sections 35, 35 and/or 35a, 35a shown in Fig. 2 might be omitted, in order to obtain softer spring action.

Figs. 6-8 illustrate a modification of the parts involved in the interaction of the bolster with the crank arms; features corresponding to those in Figs. 1-5 being designated by the same reference numerals, with a distinctive letter added, in order to dispense with repetitive description. As shown in Fig. 6, each of the crank-arms 25b, 25c has an anti-friction roller 60 resting on a wear-plate or seat 36b whose surface is cylindrically concaved about a fore-and-aft axis, and to a relatively large radius. The roller 60 may be secured against accidental displacement by an axial rod 61 whose ends project through slots 62 in upstanding flanges 63 on the arms 25b, 25c, at opposite ends of the seat 36b. As shown, there are small rollers 64 in the slots 62, secured by heads on the ends of the rod 61. Each roller 60 coacts with a corresponding wear-plate 66 or 67 on the bolster 11b. As shown in Fig. 7, each wear-plate 66, 67, is cylindrically rounded to a considerable radius about a transverse axis, so that it may rock fore-and-aft with the similar rocking of the truck frame 10b due to rail joints, cross-overs, and other track irregularities. Thus each roller 60 is always in complete fore-and-aft line-contact with the corresponding plate 66 or 67. As the roller 60 of the lower crank-arm 25c is not always in contact with its wear-plate 67 to hold this plate in position, provision is made for holding said plate against the bolster 11b independently of the roller. For this purpose, pins 70 (whose heads are accommodated in countersinks) extend up through the plate 67 and the lower bolster wall 71, and are held up by an upward-bowed leaf spring 72 (through which they extend) acting against cotter-pins 73 inserted through the upper ends of said pins 70.

Having thus described my invention, I claim:

1. In a truck of the character described, the combination with a side frame having provision

for mounting the truck axles and wheels, and also provided with lateral bearing and anchorage brackets at a substantial distance apart, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of a longitudinal elastic torsion member mounted alongside said side frame in its said bearing and anchorage brackets, and anchored by the latter against turning, and a crank attached to said torsion member adjacent the side frame bearing bracket, for connecting said torsion member to the bolster, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

2. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster movable up and down relative to said side frame in said window opening, of a torsion spring extending lengthwise of the truck and anchored to said side frame against turning, and means extending from said torsion spring into said window opening for connecting said torsion spring to the bolster, at a substantial distance from the torsion spring anchorage to the side frame, whereby the load on the bolster is elastically transmitted to the side frame through said torsion spring.

3. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster movable up and down relative to said side frame in said window opening, of a longitudinal elastic torsion member extending along the outside of said side frame and anchored to said side frame against turning, and means extending inward from said torsion member into position for engaging the bolster, at a substantial distance from the anchorage of said torsion member to the side frame, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

4. In a truck of the character described, the combination with a side frame having an axle box housing, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of a longitudinal elastic torsion member extending along the outside of said side frame and having an end anchored to said frame at the side of said axle box housing remote from said bolster, bearing means for said torsion member on the side frame adjacent said bolster, and a crank attached to said torsion member adjacent said bearing means, for engaging and sustaining said bolster, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

5. The invention as set forth in claim 4 further comprising a bracket on the side frame extending outward above the torsion member, a cover for the axle box housing, and a hanger for said cover extending upward therefrom outside the torsion member, and pivoted to said bracket above said member.

6. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having top and bottom members and a window opening, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of a bearing bracket attached to the top side frame member and also extending into the window below the bolster and

attached to the bottom side frame member, a longitudinal elastic torsion member alongside said side frame, rotatably supported by said bearing bracket, a crank attached to said torsion member adjacent said bracket and arranged to engage the bolster to sustain the same, and anchorage means for said torsion member attached to the side frame at a substantial distance from said crank, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

7. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also a window opening, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto at said window opening, of bearing brackets extending outward from said side frame at said window opening, a crank between said bearing brackets having trunnions rotatable in said bearing brackets and itself extending into said window opening to engage the bolster to sustain the same, longitudinal elastic torsion members along the outer side of said side frame connected to said crank at their adjacent ends, and anchorage means for the outer ends of said torsion bars attached to the side frame, whereby the load on the bolster is elastically transmitted to the side frame through said torsion members.

8. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster movable up and down relative to said side frame in said window opening, of supporting brackets on the outer side of said side frame, at either side of its said window opening, equipped with removable bearings; a crank between said brackets having trunnions resting and rotatable in said bearings, and itself extending into said window opening to engage the bolster to sustain the same; a longitudinal elastic torsion member extending along the outside of said side frame through said crank and its trunnions, and anti-turningly engaged in said crank; and anchorage means for said torsion member attached to the side frame at a substantial distance from said crank, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

9. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of a longitudinal elastic torsion member alongside said side frame, bearing means for said torsion member on the side frame adjacent said bolster, a crank attached to said torsion member adjacent said bearing means and extending beneath a portion of the bolster to sustain the same, an anti-friction roller mounted on said crank to roll and shift transversely of the truck, a bearing block interposed between the bolster and said roller, with capacity for rocking fore and aft of the side frame relative to the bolster, and anchorage means for said torsion member attached to the side frame at a substantial distance from said crank, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

10. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and a

load-sustaining bolster associated with said side frame and movable up and down relative thereto; of an elastic torsion member extending lengthwise of the truck and anchored to said side frame against turning; means for connecting said torsion member to the bolster at a substantial distance from the anchorage of said torsion member to the side frame, and thus transmitting the load on the bolster to the side frame through said torsion member; and resilient buffer means carried by said side frame for engaging the bolster after substantial torsion of said torsion member, and thus coacting with said torsion member in transmitting the load on the bolster to the side frame.

11. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto in said window opening; of a longitudinal elastic torsion member extending along the outside of said side frame; a crank attached to said torsion member and extending into said window opening to engage the bolster and sustain the same; anchorage means for said torsion member attached to the side frame at a substantial distance from said crank; and resilient buffer means carried by said side frame for engaging the bolster in said side frame window, after substantial torsion of said torsion member, and thus coacting with said torsion member in transmitting the load on the bolster to the side frame.

12. In a truck of the character described the combination with a side frame having provision for mounting the truck axles and wheels, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of torsion springs extending lengthwise of the truck, one above the other, and both anchored to said side frame against turning, and means for connecting said torsion springs to the bolster at substantial distances from their anchorages to the side frame, whereby the load on the bolster is elastically transmitted to the side frame through said torsion springs, the connecting means for one of said torsion springs being arranged to come into action only after substantial torsion of the other torsion spring.

13. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto at said window opening, of elastic torsion members

extending lengthwise of the side frame outside the same, one above another, and anchored to said side frame, against turning, at opposite ends of said frame, and crank arms attached to the mid-portions of said torsion members extending into said window opening to engage the bolster and sustain the same, whereby the load on the bolster is elastically transmitted to the side frame through said torsion members.

14. In a truck of the character described, the combination with a side frame having axle mounting means, and a load-sustaining bolster associated with said side frame and movable up and down relative thereto, of elastic torsion members extending lengthwise of the side frame one above another, means for anchoring the ends of the upper torsion member to said side frame beyond said axle mounting means, means for anchoring the ends of a lower torsion member to said side frame between said axle mounting means, and cranks attached to the intermediate portions of said torsion members and arranged to engage the bolster to sustain the same, whereby the load on the bolster is elastically transmitted to the side frame through said torsion members.

15. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster movable up and down relative to said side frame, of a longitudinal elastic torsion member extending along the outside of said side frame and anchored to said side frame against turning, and means extending inward from said torsion member into position for engaging the bolster at a substantial distance from the anchorage of said torsion member to the side frame, said means comprising a crank arm secured to said torsion member adjacent said window opening, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

16. In a truck of the character described, the combination with a side frame having provision for mounting the truck axles and wheels, and also having a window opening, and a load-sustaining bolster movable up and down relative to said side frame in said window opening, of a longitudinal elastic torsion member outside of and attached to said side frame, and means projecting inward from said torsion member through the side frame window opening for coactively engaging the bolster end, whereby the load on the bolster is elastically transmitted to the side frame through said torsion member.

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