Jan. 10, 1956 M. K. COSKUN 2,730,048

CAR TRUCK

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Fig. 1.

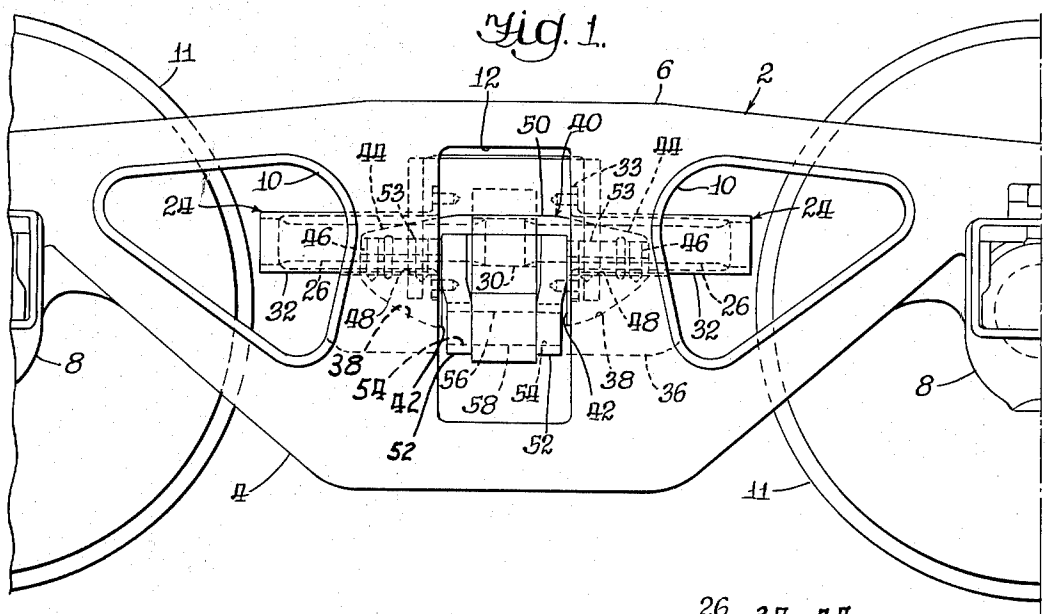
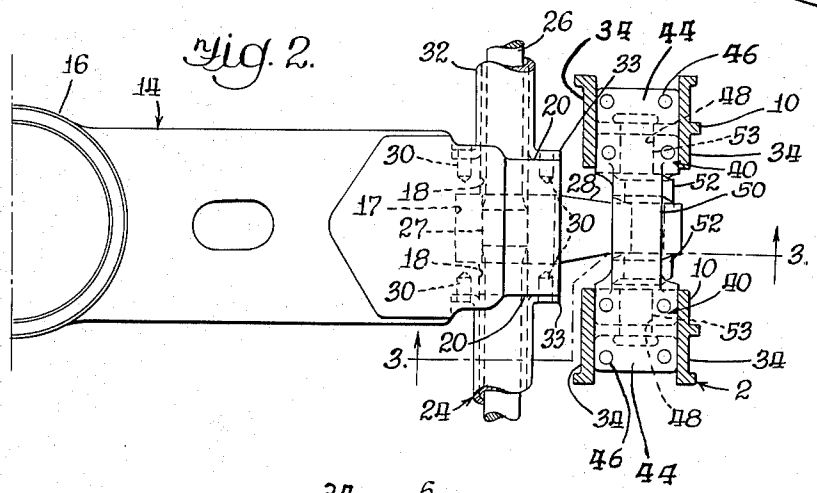



Fig. 2.



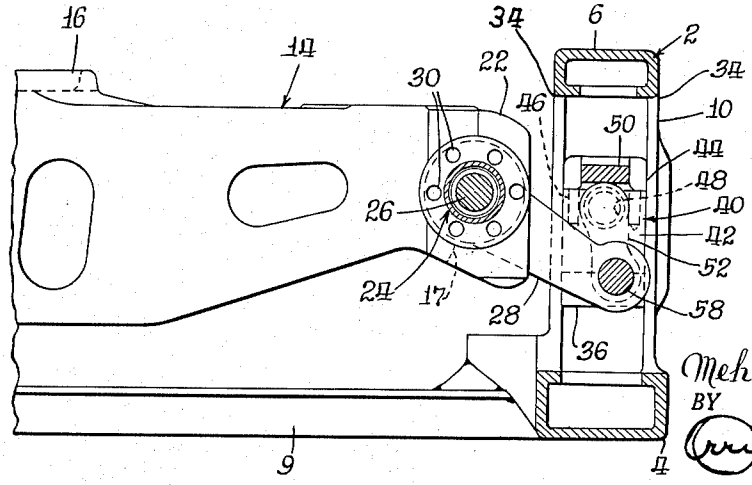




Fig. 3.

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CAR TRUCK

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Fig. 4.

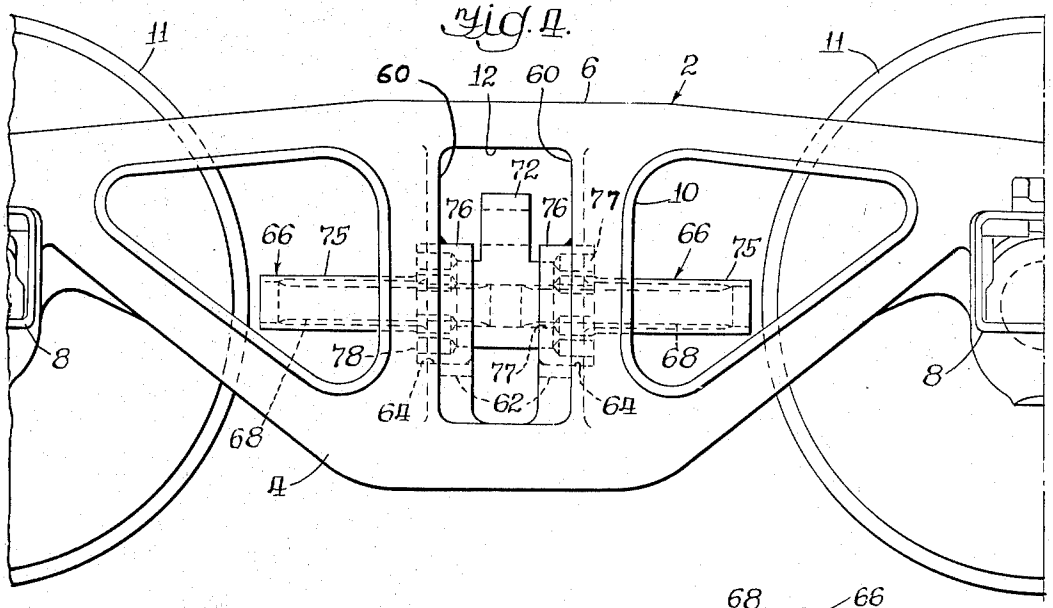



Fig. 5.

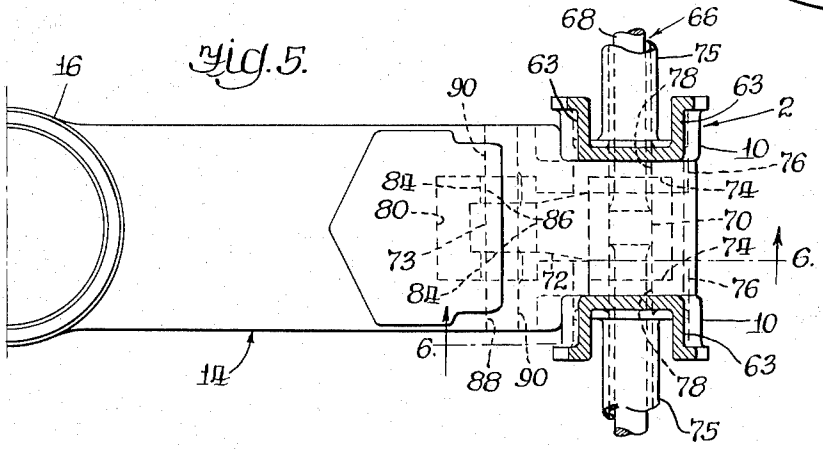
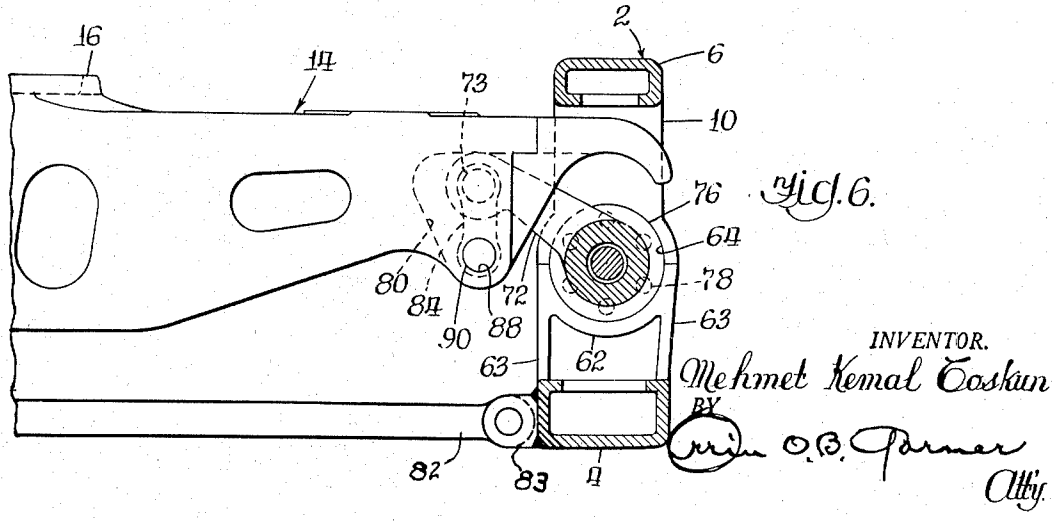



Fig. 6.




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United States Patent Office 2,730,048 Patented Jan. 10, 1956



2,730,048

# CAR TRUCK

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Application June 12, 1952, Serial No. 293,049

6 Claims. (Cl. 105—190)

The invention relates to a railway car truck and more particularly to a novel means of suspension for a bolster associated therewith.

It is a primary object of the invention to utilize the resilient deformable characteristics of a torsion spring unit to flexibly mount a bolster on a railway car truck.

It is another general object of the invention to provide a novel bolster supporting linkage arrangement offering said bolster flexible, well balanced suspension from the side frames of a railway car truck.

It is a more specific object of the invention to provide swing hangers to suspend a bolster from the opposite sides of the railway car truck and thereby afford lateral flexibility for said bolster.

A still more specific object of the invention is to provide self-aligning bearing supports for the mentioned swing hangers.

Other objects of the invention will become apparent in the course of the following description and from an examination of the associated drawings, wherein corresponding numerals are used to designate identical parts throughout the figures. In the drawings:

Figure 1 is a side elevational view of a railway car truck embodying the invention;

Figure 2 is a fragmentary plan view of a portion of the railway car truck embodying my invention;

Figure 3 is a fragmentary front elevational view, partly in section, of the embodiment of Figure 1;

Figure 4 is a side elevational view of an alternate embodiment of the invention;

Figure 5 is a fragmentary plan view of the embodiment of Figure 4; and

Figure 6 is a fragmentary front elevational view, partly in section, of the embodiment of Figure 4.

It is to be noted that the drawings illustrate one-half of a railway car truck only, consequently reference is herein made only to that portion illustrated, it being understood that the structure shown and described is duplicated in the other portion of said truck.

Describing the preferred embodiment of the invention in detail and having reference to Figures 1 to 3, wherein the side frame, generally designated **2**, is of conventional construction, being composed of a tension member **4** and compression member **6** merging at respective ends thereof to integrally form journal boxes **8**, in which are conventionally journalled the axle of the associated wheel and axle assembly **11**. Tie bars **9** are disposed transversely of the truck intermediate the side frames and offer means to rigidly interconnect said frames. Spaced vertical columns **10, 10** define an opening **12** centrally of the side frame **2**. A bolster, generally designated **14**, may be disposed transversely of the truck having its end adjacent the oepning **12** of the side frame.

The bolster **14** provides at **16** for a conventional method of connection to a related car body. Adjacent the end of the bolster and centrally thereon, a vertically disposed recess or cut out **17** is formed and comprises an opening directed downwardly and outwardly from the



end of the bolster. A pair of axially aligned holes or apertures **18, 18**, are formed in the bolster end and directed transversely thereof in such a manner as to communicate with the recess **17**. Substantially flat surfaces **20, 20** are presented on the respective sides of the bolster in the area immediately adjacent the holes **18, 18**.

It is to be noted that the end **22** may be demountably secured to the bolster **14** and may be removed to permit easy assembly and disassembly of the torsion spring unit generally designated **24**.

The torsional spring unit **24** consists of the torsion bar or torsion spring **26** extending transversely of the bolster and disposed within the holes **18, 18** on the end thereof. The crank arm **28** is movably received within the recess **17** and is disposed to surround and rigidly connect to the mid portion **27** of the torsion bar **26** by any suitable means, such as a key (not shown). On each side of the bolster end **22** the protruding end of the torsion bar **26** is sleeved within the related tubular torsion housing **32**. A flange **33** on each housing **32** is disposed to abut the related surface **20** of the bolster end **22** and rigid connection to the bolster may be provided by any suitable means, such as bolts or the press-fitted dowel pins shown at **30**. Adjacent each outboard end of the torsion bar **26**, the outer surface of the bar **26** and the inner surface of the related housing **32** converge to engage and provision is made for rigid connection therebetween such as by spline or other suitable means. The torsion bar illustrated in the preferred embodiment of the invention is of circular cross section, however other cross sectional forms would equally well suit the function of the invention.

Within each vertical column **10** of the side frame **2**, a ledge **36** is presented intermediate the walls **34, 34** and integrally formed therewith. The top face of each ledge **36** defines an arcuate concave bearing surface **38** disposed to face inboardly of the side frame and form, with the like bearing surface **38** of the opposite column **10**, a cup-like mounting which offers slidable cradled support for the selft-aligning bearing assemblies indicated generally at **40, 40**.

The self-aligning bearing assemblies **40, 40** comprise a pair of lower blocks **42, 42** each having an arcuately formed convex bottom surface in complementary slidable engagement with the associated bearing surface **38** of the related column **10**. A cap **44** is preferably fixedly secured to the top surface of each block **42** as by press-fitted dowel pins, shown at **46**. Each cap and block assembly defines the journal or bearing **48**, the function of which is hereinafter more fully described. A rigid connection is provided between the cap and block assembly of each column by the plate **50**, which, as illustrated, may be integrally formed with the bearing caps **44, 44** and disposed within the opening **12** of the side frame **2**.

Swing hangers **52, 52** are movably suspended within the side frame opening **12** by means of the pivotal connection between the associated bearing portion **53** of each hanger and the journal **48** of the cap and block assembly **40**. The crank arm **28** extends outboardly of the bolter **14** and intermediate the lower ends of the swing hangers **52, 52**. The swing hangers **52, 52** and the crank arm **28** present axially aligned holes **54, 54** and **56**, respectively, through which is positioned the pivotal pin **58** thus affording a rigid swing hanger assembly with the crank arm pivotally connected thereto. The swing hanger assembly enables the crank arm **28** to have a floating pivotal connection with the side frame **2**.

Referring now to Figures 4 through 6, wherein another embodiment of the invention is illustrated. Spaced vertical columns **10, 10** again define opening **12** in the side frame **2**. Longitudinally of the frame, the respective sides of the opening **12** are defined by transverse walls **60, 60** formed integral with the related column. In ad-

dition, each column **10** is characterized by the arcuate ledge **62**, concave in an upward direction and formed integrally with the transverse wall **60** of the related column. Vertical walls **63, 63** merge with the tension member **4**, the related column **10**, and the arcuate ledge **62**, thereby adding rigidity and strength to the structure. A hole or aperture **64** is presented by the wall **60** of each column **10** and the arc defined by the lower segment of said hole corresponds with the arc defined by the top face of the arcuate ledge **62**. The torsion spring unit, generally designated **66**, comprises the torsion bar **68** having a rigid connection centrally thereof as at **70** to the crank arm **72**. Each side of the crank arm **72** presents a circular boss which rotatably mounts within a complementary recess **74** of the associated mounting block **76**. Centrally of each mounting block **76**, a hole **78** is presented to allow the related end of the torsion bar to loosely extend therethrough. The protruding end of the torsion bar is in spaced sleeved relation with the associated tubular torsion housing **75**, which in turn abuts and is rigidly but demountably connected to the outboard face of the related mounting block **76**. Any suitable means for rigidly connecting the housing **75** to the mounting block **76** may be employed, such as the press-fitted dowel pins **77** illustrated. Adjacent the outboard end of each housing **75**, said housing and the associated end of the torsion bar **68** converge and provision is made for rigid interconnection therebetween, such as by spline or other suitable means.

The torsion spring unit is assembled and rigidly connected to the side frame **2** by the complementary reception of each mounting block **76** within the hole **64** of the related column **10**. In the preferred embodiment, the rigid connection between the spring unit and the related column is accomplished by welding the mounting block to the column at points of contact therebetween.

As noted in the embodiment of Figures 4 through 6, the crank arm **72** is disposed to extend inboardly of the side frame and is received by the central recess **80** of the bolster **14**. Said recess presents an opening downwardly and outwardly directed from the end of the bolster.

Within the recess **80**, a pair of swing hangers **84, 84** are pivotally connected to the inboard end of the associated crank arm **72** as at **73**. The swing hangers **84, 84** preferably extend downwardly on each side of the crank arm **72** and each presents on its lower end the hole **86**, which is aligned with a like hole **88** on the related side of the bolster. It should be noted that the holes **88, 88** are coaxially aligned. Pivotal pins **90, 90** are inserted within the associated holes **86** and **88**, thereby affording floating pivotal swing hanger connection between the crank arm **72** and the associated end of the bolster **14**.

It should be noted that the embodiment of Figures 4 through 6 provides for a flexible connection between the side frames **2** by means of a pivotal connection between the tie bar **82** and the bracket **83** of the side frame. Thus relative vertical movement between the side frames is accommodated.

In the operation of a railway car truck, it is desirable to flexibly suspend the bolster from the side frames and to afford the bolster resilient movement relative to the side frames vertically, laterally, and longitudinally thereof.

In the embodiment of Figures 1 to 3, the bolster, when subjected to longitudinal thrusts, urges the self-aligning bearing assemblies **40, 40**, due to the rigid connection therebetween, to move concurrently along the arcuate bearing surfaces **38, 38** of the related columns **10**. As a given longitudinal thrust is dissipated, the cradled reception offered the bearing assemblies **40, 40** by the bearing surfaces **38, 38**, coupled with the gravitational forces exerted on the bolster, return said bolster and bearing assembly to the bottom or normal position.

Lateral thrusts on the bolster are accommodated by the pivotal swing hanger support offered said bolster by the hangers **52, 52**. It could be said that the swing hangers



offer pendulum support for the bolster in that gravity again returns the bolster to the neutral position when the lateral thrusts are dissipated.

The torsional spring unit offers resilient vertical support for the bolster. Vertical movement of the bolster urges the crank arm to rotate about the longitudinal axis of the torsion bar. The rigid connection between the torsion bar and the crank arm causes a torque or twisting moment to be imparted to the torsion bar. The twisting action of the torsion bar is resisted at its extremities by the rigid connection to the torsion bar housings, which in turn are secured to the bolster. Thus the flexible torsional deformation of the torsion bar is operative to absorb the induced twisting moment.

It is to be noted that the housings or tubes may be rigid, that is, designed to resist torsional deformation with the twisting moment being absorbed by the resilient torsional deformation of the torsion bar, or may be torsionally deformable whereby both the tube and the bar cooperate to absorb the induced twisting moment.

It is also worthy of note that the torsion bars and housings are designed to function within certain stress capacity, thereby assuring that the torsional stress induced will not exceed the elastic limit for the material used. This prevents permanent deformation of the torsion bar which would impair the resilient function of the unit.

The embodiment of Figures 4 through 6 operates in a manner substantially similar to that described relative to the embodiment of Figures 1 to 3. In this embodiment, the torsional spring unit is rigidly mounted to the side frame, thus leaving the space intermediate the side frames clear for mounting other desired truck structure.

In the embodiment of Figures 4 to 6, lateral thrusts are accommodated by the pendulum action of the swing hangers and, as before noted, the force of gravity is operative to return the bolster to the neutral position.

Again vertical movement of the bolster urges the crank arm to rotate about the longitudinal axis of the torsion bar. It is to be noted, however, that the crank arm is pivotally supported within the recesses of the mounting blocks, thus preventing bending of the torsion bar and assuring that a pure twisting moment will be imparted thereto by the action of the bolster, as transmitted through the crank arm. The rigid connections of the housings to the torsion bar on the side frame resist the twisting of the torsion bar, consequently the bar resiliently absorbs vertical movement of the bolster by means of its elastic torsional deformation.

It is to be noted that the torsional spring of the embodiments illustrated is preferably of a metallic material, however, other materials having the required resiliently deformable characteristics could reasonably be used.

I claim:

1. In a railway car truck, a side frame having spaced columns, a bolster, means to support the bolster from the side frame comprising a pair of torsion housings rigidly secured to the bolster, said housings being in spaced relation and extending longitudinally of the truck, a torsion bar having its opposite end portions disposed within the respective housings, a crank arm having one end thereof rigidly connected to the midportion of the bar, said arm extending outboardly of the truck intermediate said columns, bearing assemblies in the respective columns, swing hangers having their upper ends journaled in the bearing assemblies, a pivotal connection between the lower ends of the swing hangers and the end opposite the mentioned end of the crank arm, and means operative to maintain said bearing assemblies in alignment.

2. A railway car truck according to claim 1, wherein said aligning means comprises cradle supports in said columns carrying said bearing assemblies.

3. A railway car truck according to claim 2, and including a rigid connection between the bearing assemblies, said bearing assemblies being slidably carried on said supports.

4. In a railway car truck, a side frame, a bolster, means to support the bolster from the frame comprising a torsion spring bar journaled in the bolster, a crank arm having inner and outer ends, the inner end being connected to the bar, swing hangers having upper and lower ends, self-aligning bearing means arranged and positioned in the frame to be movable with respect thereto in a direction lengthwise thereof, said bearing journaling the upper ends of the swing hangers to the side frame, and a pivotal connection between the lower ends of the swing hangers and the outer end of the crank arm, said swing hangers and said crank arm being arranged and disposed to permit the movement of the pivotal connection in directions extending both longitudinally and transversely of the truck to minimize twisting stress on the crank arm and swing hangers imparted by the longitudinal movement of the bolster relative to the side frame.

5. A railway car truck according to claim 4, wherein said self-aligning bearing means comprises cradle supports in the side frame, and bearing block assemblies slidably carried by the supports, said swing hangers being journaled to the assemblies.



6. In a railway car truck, a side frame member, a bolster member, means to support the bolster member from the frame member, said means comprising a torsion spring bar carried by one of said members, a crank arm having ends, one of said ends being connected to the bar at a point intermediate its ends, swing hangers, a bearing means movably positioned in the other of said members to be self-alignable with respect to the transverse center line of said member, said bearing means journaling the swing hangers to said other member, and a pivotal connection between the swing hangers and the other end of the crank arm, said pivotal connection being movable in directions extending lengthwise and transversely of the truck to reduce twisting stress on said crank arm and said swing hangers.

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