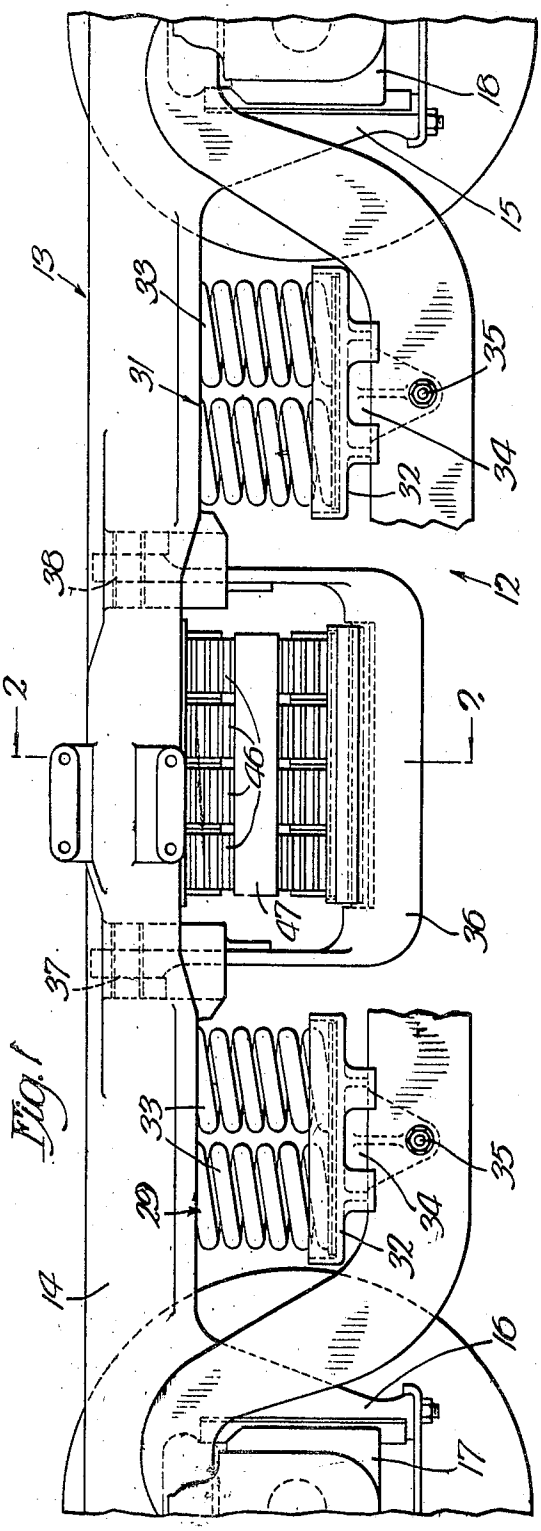
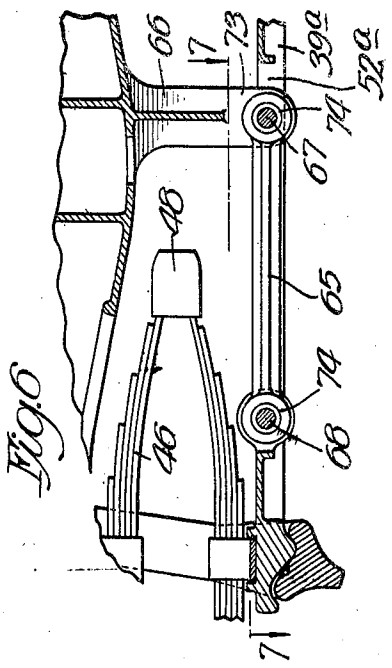
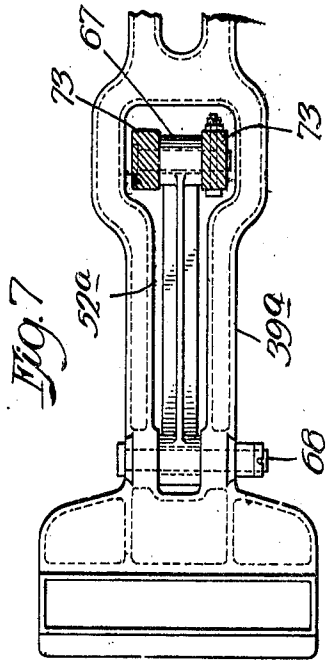
Feb. 8, 1944. K. EDAHL 2,340,869

STABILIZING MECHANISM FOR RAILWAY TRUCKS

Filed May 3, 1941 3 Sheets-Sheet 1




INVENTOR.
Krute Edahl
BY Mann, Brown & Cof
ATTORNEYS.

Feb. 8, 1944. K. EDAHL 2,340,869

STABILIZING MECHANISM FOR RAILWAY TRUCKS

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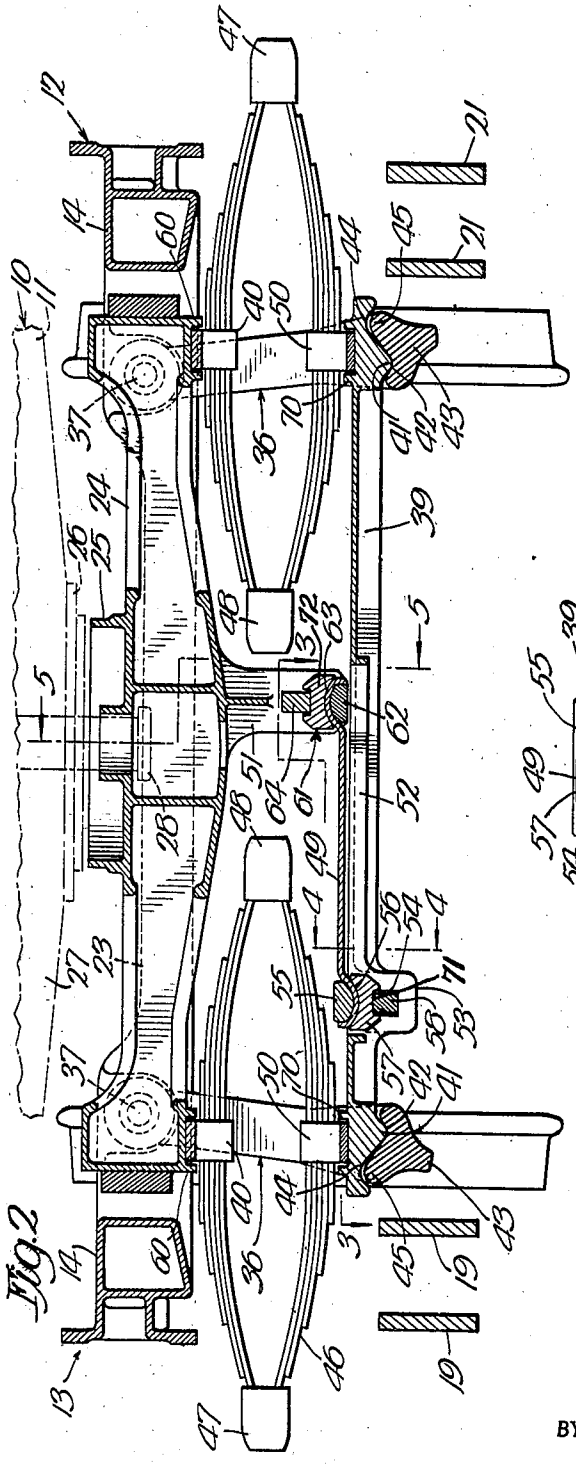


Fig. 2

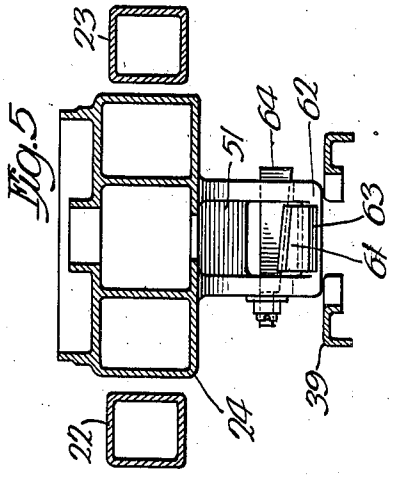


Fig. 5

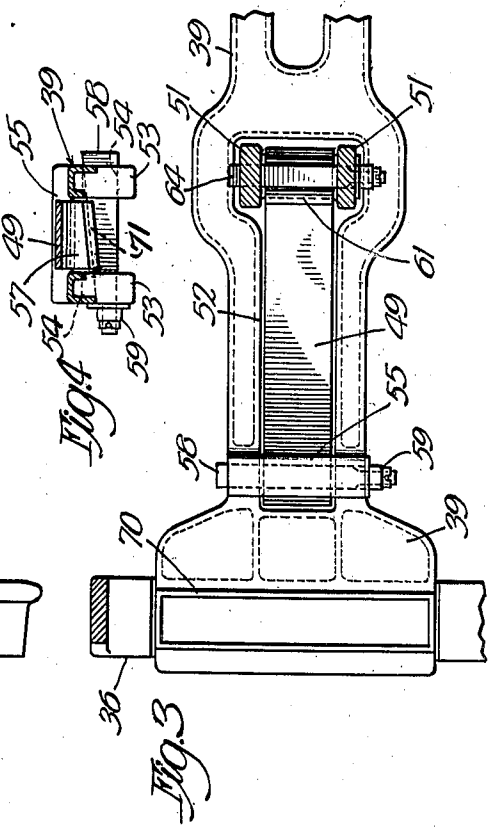


Fig. 3



Fig. 4

INVENTOR.
Krute Edahl
BY Mann, Brown & Cox
ATTORNEYS.

Feb. 8, 1944. K. EDAHL 2,340,869

STABILIZING MECHANISM FOR RAILWAY TRUCKS

Filed May 3, 1941 3 Sheets-Sheet 3

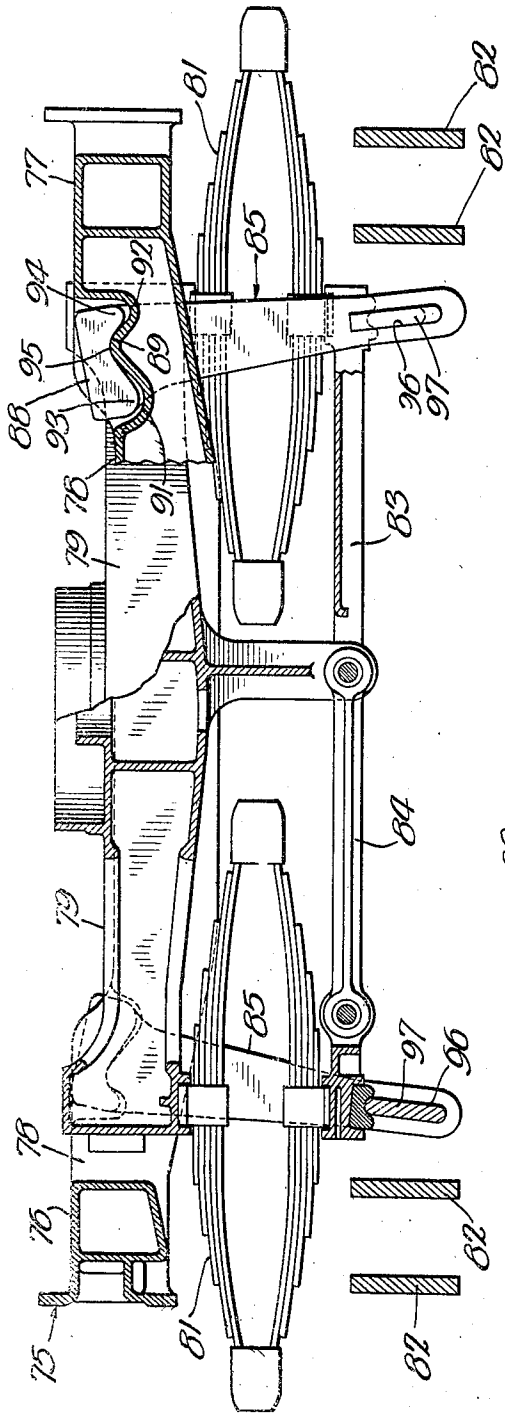



Fig. 8

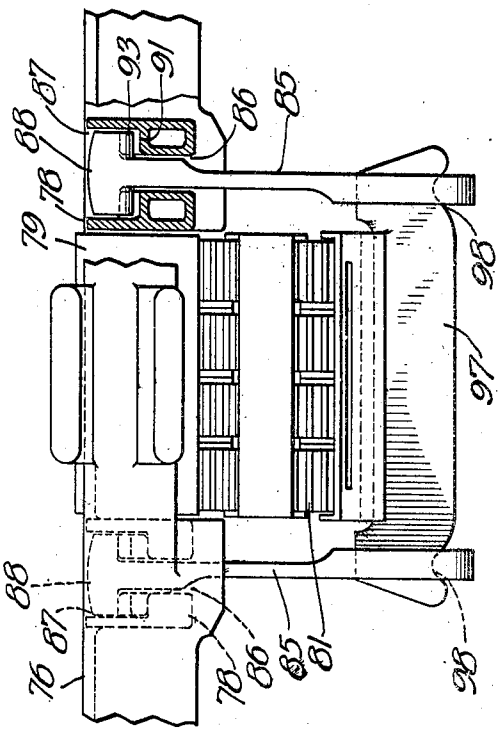



Fig. 9

INVENTOR.
Krute Edahl
BY Mann, Brown & Co.
ATTORNEYS.

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# UNITED STATES PATENT OFFICE

2,340,869

## STABILIZING MECHANISM FOR RAILWAY TRUCKS

Knute Edahl, Chicago, Ill., assignor to Holland Company, a corporation of Illinois

Application May 3, 1941, Serial No. 391,773

8 Claims. (Cl. 105—190)

This invention relates to trucks for railway cars and more particularly to means for stabilizing the mechanism for banking the bolster on curves.

One of the principal objects of the invention is the provision of a new and improved mechanism for causing banking of the truck bolster without tilting the bolster supporting springs relative to the bolster when the truck moves around curves at high speeds.

A further object of the invention is the provision of new and improved means for connecting the bolster and swing hangers for insuring simultaneous movement of these two elements together with novel means for causing banking of the bolster on curves.

A still further object of the invention is the provision of new and improved means for swingingly supporting the bolster from a truck frame in such a manner that the bolster will be supported by spring assemblies that in turn are held by suitable means from tipping or tilting relative to the bolster.

Another object of the invention is the provision of a new and improved means for stabilizing the bolster supporting and banking mechanism of a railway truck that is simple in construction, easily installed, inexpensive to manufacture, and that is efficient and positive in action during its operation.

Other and further objects and advantages of the invention will appear from the following description, taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevation of a railway truck, especially adapted for passenger service;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Fig. 6 is a transverse vertical section through a portion of the bolster and the supporting mechanism with parts broken away and showing a modified form of construction;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a transverse section of the truck showing a modified form of bolster suspension; and

Fig. 9 is a side elevation thereof, with parts in section and parts broken away.

The advent of high speed trains has necessitated changes in the conventional railway equipment to meet the new requirements. Many new problems have arisen. For instance, the roadbeds, for the most part, were designed for trains at much lower speeds and hence the banking on curves with conventional equipment is inadequate for present day travel. The increased centrifugal force on curves presents a problem in the proper banking of the cars and the increased speeds over end joints and the augmented shock of the wheel flanges against the rails during the nosing of the trucks and on curves presents serious questions that may be, for the most part, ignored in slower moving cars. The present invention seeks to stabilize the movement of the bolster and spring assemblies and cause increased banking of the bolster when the truck travels around curves.

Referring now to the drawings, the reference character 10, Fig. 2, designates a railway car which comprises the body 11, shown more or less diagrammatically in Fig. 2, and the truck or substructure 12 that supports the body.

The truck 12, as herein disclosed, is, for the most part, the conventional passenger car truck and comprises the conventional truck frame 13 having the side bars 14. Each end of each side bar 14 is provided with downwardly extending pedestals 15 and 16, Fig. 1, as is usual in such constructions. Slidably mounted between the pedestals at each end of the frame 13 are the journal boxes 17 and 18, respectively, and seated on these journal boxes at each side of the truck are the conventional equalizer bars 19 and 21. These bars are arranged in pairs at each side of the truck, as shown in section in Fig. 2.

Extending transversely to the truck at the central portion thereof are transoms 22 and 23, Fig. 5, which rigidly connect the central portion of the side frames 13 together and are spaced apart to form clearance for a bolster 24 which is adapted to be positioned between these transoms in the usual manner. The central portion of the bolster is provided with a conventional coupling 25 which engages a cooperating coupling member 26 on the body bolster 27 of the body 11. The conventional coupling pin is shown at 28.

The truck frame 13 is supported from the equalizer bars at each side of the truck by means of spring assemblies 29 and 31 at opposite end portions of the equalizer bars, Fig. 1. Each of these assemblies comprises a spring seat as 32 on which the helical springs 33 are seated. The spring seat 32 rests on the equalizer bars and is held in position by means of a tongue or projection 34 extending between the bars and a bolt 35 extending transversely through the bars and the projection. The upper ends of the springs 33 engage beneath the side bars 14 for supporting the same.

The truck construction thus far described is of the usual or any well known type and for that reason, it is not thought necessary to further describe or illustrate the same.

Suitable means are provided for resiliently supporting the bolster from the truck frame 13 and in the construction disclosed, swing hangers and spring units are employed for this purpose, as is usual in such constructions.

In the form of the construction selected to illustrate one embodiment of the invention, there is a spring hanger 36 at each side of the truck and each spring hanger is in the form of a U with upstanding arms that are pivoted as at 37 and 38 to the side frames, as shown more clearly in Figs. 1 and 2 of the drawings. The spring or swing hangers 36 at opposite sides of the truck are connected together by a spring plank 39, Fig. 2, which is so constructed that the spring hangers in normal position will diverge downwardly so that upon rounding curves, the bolster is free to swing to a limited extent endwise in either direction. As a result of the inclination of the swing hangers, the outer end of the swing hanger will move upwardly more rapidly than the other end of the spring hanger moves downwardly when the bolster moves endwise so that the body will be banked to a certain extent on curves. In order to increase the banking action, the connection between the spring hangers and the ends of the spring plank are specially constructed. This connection is substantially the same as that disclosed in the joint application of Edahl et al., Serial No. 369,180, for Railway car trucks. The essential features of this connection will now be described.

Since this connection is the same at both ends of the spring plank, only one need be described.

As shown in Fig. 2, the spring plank is provided on its under side at each end with a downward extension 41 which is curved on its lower side for engaging a corresponding curved recess 42 on the upper side of the horizontal portion 43 of the spring hangers 36 and upwardly and outwardly of this downward extension or projection, the spring plank is provided with a curved recess 44 which is adapted to be engaged by an upwardly and outwardly extending projection 45 on the cross member 43 of the spring hanger when the spring hanger 36 moves outwardly. This projection is materially above the lower edge of the projection 41. In other words, the parts are so constructed that when the projection 41 engages in the recess 42, the parts will be in normal position, as shown in Fig. 2. The projection 45 is normally spaced from the recess 44 so that the swing hanger 36 and with it the bolster will have a limited outward swinging movement before the projection 45 engages the recess 44. When the bolster swings outward a predetermined distance, the projection 45 will engage in the bottom of the recess 44. From there on the effective radius of the swing hanger will be decreased and consequently, the lifting or vertical movement of the spring plank will be materially increased so as to bank the car body at a greater inclination than it would with the swing hangers merely pivoted to the spring plank in the conventional manner.

Interposed between the spring plank 39 and the bolster at each end thereof are a plurality of springs 46 and in the form shown, elliptic springs are employed, Figs. 1 and 2. These springs at each end of the bolster are assembled together as a unit by clips 47 and 48 at the outer ends of the springs and by the clips 40 and 50, Fig. 2, that engage the central portions of the springs for holding the springs as a single unit under each end of the bolster. These units engage between cooperating flange members 60 and 70 on the underside of the bolster and the upper surface of the spring plank 39, respectively.

When the truck is caused to travel at high speed on curves, the bolster will be thrown outwardly by centrifugal force and unless means be provided for preventing it, the bolster will tend to tilt the springs 46 relative to the spring plank. In order that the springs may be so held that the weight may be applied substantially normal to the same, a radius arm, plate or stabilizing bar is provided. This arm or bar must be so constructed and attached that it will cause the spring plank to move with the bolster and at the same time, permit the vertical oscillation of the springs 46.

In the form of the device shown in Fig. 2, this is accomplished by the use of a spring arm or resilient radius member 49 which connects the bolster and the spring plank. As shown, the bolster is provided with a rigid projection 51 extending downwardly adjacent to the inner ends of the springs 46 at one side of the truck and is adapted to be attached to the spring plank adjacent to the springs at the opposite side of the truck as shown more clearly in Fig. 2. It is desirable that the radius arm be as long as practical in order that its effect on the relative lateral movement of the bolster and spring plank be reduced to a minimum when the springs are compressed. This radius bar 49 is rigidly attached to the projection 51 and to the spring plank in a manner that will now be described.

The spring plank 39 is provided with a longitudinally extending recess 52, Fig. 3, and at the outer end of this recess, the spring plank is provided at its opposite edges with a pair of depending jaws or ears 53 through which transverse slotted ojenings 54 are provided, Fig. 2. Extending transversely of the spring plank and above the slotted opening 54 is a transverse member 55 integral with the spring plank and having its upper edge extending slightly above the upper edge of the spring plank. The lower side of the transverse member 55 is curved in cross-section for engaging in the concavity of a corresponding curved end 56 of the radius arm 49. A saddle or movable clamping member 57 engages the lower or convex surface of the extension 56. The clamping member is held in clamping position by means of a wedge-shaped bolt 58 extending through the slot 54, Fig. 4, and having a nut 59 threaded on the smaller end thereof. This wedge-shaped bolt or member 58 is adapted to engage an inclined surface 71 of the clamping member 57 and force the same upwardly into clamping engagement with the member 56 for holding the same rigidly against the transversely extending member 55 of the spring plank. The connection at 61 is similar to that already described in which a saddle or clamping member 72 clamps the curved inner end 63 of the radius member 49 against a transverse member 62 rigid with the extension 51. A wedge-shaped bolt 64, similar to the bolt 58, is employed for wedging the parts together.

It will thus be seen that both ends of the radius member 49 are rigidly held in position, one being rigidly connected to the extension 51 and the other to the spring plank 39.

The radius member 49 is of spring material so

that its resiliency will permit the vertical oscillation or vibration of the bolster relative to the spring plank.

The form of the construction shown in Figs. 6 and 7 differs from that shown in Figs. 3, 4 and 5 in that a rigid radius arm or member **65** is employed instead of the resilient arm or bar **49** of the previously described construction. This arm is pivoted to the bolster and spring plank. In this form of the device, the bolster is provided with a downwardly extending rigid arm **66** which is integral with or rigidly connected to the bolster and has its lower end bifurcated as at **73**. The radius or stabilizing bar **65** is pivotally connected to this extension between the furcations **73** as shown at **67** in Figs. 6 and 7.

The outer end of the radius rod or member **65** is likewise pivotally connected to the spring plank **39***a* as at **68**. Suitable journal bushings **74** may be provided for both ends of the radius arm, if desired. This rigid rod **65** will cause the spring plank **39***a* to move with the bolster and at the same time, will permit the bolster to move vertically relative to the spring plank **39***a* for accommodating the vertical movements of the springs **46**. The spring plank **39***a* is provided with a slot **52***a* similar to the slot **52** in the form of the construction shown in Fig. 3. The radius arm operates in this slot.

In the operation of the device, the bolster and spring plank are free to swing laterally to a limited extent which will permit the ordinary nosing of the truck. On curves, however, due to centrifugal action, the projections **45** will engage the recesses **44** for shortening the radius around which the outer spring hanger rotates and consequently, on curves, the outer spring hanger will raise the outer end of the bolster a greater amount when the inner end of the bolster is lowered thereby banking the bolster on curves. During this lateral movement, the radius rod or stabilizer bar **49** will cause the spring plank and the bolster to move outwardly simultaneously and to substantially the same amount whereby the load will be applied normal to the springs **46**.

In the form of the construction shown in Fig. 6, the radius rod or stabilizer bar **65** will pivot at **67** and **68** thereby providing for the vertical movement of the bolster on the springs **46**.

In the form of construction shown in Fig. 8, the truck frame is shown at **75** and is provided with the side frame members **76** and **77** which are rigidly connected together at their intermediate portions by the transoms **78** at opposite sides of the bolster **79** as in the previous construction. Since the arrangement of the springs **81**, equalizer bars **82**, spring plank **83** and the radius bar **84** are substantially the same as in the previous construction, it is not thought necessary to repeat the description at this point.

This form of construction differs from that disclosed in Figs. 1 to 7 in that the cooperating cam means for banking the bolster on curves is provided at the upper ends of the hanger members **85** instead of at the lower ends as in the previous construction.

Each of the transoms **78** is provided with a vertical slot **86** extending longitudinally of the transom and through which extend the hanger members or links **85**, as shown more clearly in Fig. 9. A recess **87** is provided in the transoms above the slot **86** for receiving a head **88** of the hanger link **85**. The bottom wall of the recess **87**, Fig. 8, is provided with an upwardly extending tooth or projection **89**, Fig. 1, at opposite sides of the link **85**, Fig. 9, each having recesses **91** and **92** at opposite sides thereof arranged longitudinally of the transoms. The recess **91** extends downwardly to a lower level than the recess **92**, as shown in Fig. 8. The head **88** of the corresponding hanger link **85** is provided with a pair of downwardly extending projections or teeth **93** and **94** for engagement in the recesses **91** and **92**, respectively. The head is also provided with an upwardly extending recess **95** which is adapted to rest on the upwardly extending projection **89** in normal position of the bolster, as shown in Fig. 8.

The parts are so constructed that the projection **93** is spaced slightly from the bottom of the recess **91** when the parts are in normal position so as to permit slight angular or lateral movement of the bolster before the projection **93** engages the bottom of the recess **91**. The lower ends of the arms **85** are provided with vertical slots **96** for receiving a hanger bar **97** therein. Each of the hanger bars **97** is provided with a recess **98** on its lower edge which is adapted to be engaged by the lower marginal edge of the slot **96** for holding the hanger bar **97** in position. The hanger bars **97** support the spring plank **83** in the usual manner.

In the normal position of the bolster, the hanger links **85** will extend downwardly and outwardly as shown in Fig. 8 but when the truck travels around curves at high speed, the bolster which supports the car body will be thrown outwardly by centrifugal force and when the links **85** at the right in Fig. 8 are thrown outwardly, it will be seen that the projection **93** on the outer hanger link will, after the initial movement of the bolster, engage in the bottom of the recess **91** and will cause a sharp banking of the bolster due to the shortening of the radius about which the hanger links **85** swing under such conditions. The projection **94** on the inner link; that is, the link on the inner side of the curve will simultaneously engage in the recess **92** which will also shorten the link's radius somewhat but not so much as that of the outer link.

It is thought from the foregoing, taken in connection with the accompanying drawings, that the construction and operation of my device will be apparent to those skilled in the art and that changes in size, shape, proportion and detail may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. In a railway truck, a truck frame, swing hangers pivotally supported by said frame, a spring plank connecting the lower portions of said hangers, springs supported on said plank, a bolster supported on said springs, and means causing said bolster and the vertical axes of said springs to remain substantially normal to each other while said truck is rounding curves at high speed, said means comprising a downwardly extending rigid projection on said bolster and a single resilient plate rigidly connected at one end to said projection and rigidly connected at its other end to said spring plank, said resilient plate extending normally substantially horizontally.

2. In a railway truck, a truck frame, swing hangers pivotally supported by said frame, a spring plank connecting the lower portions of said hangers, springs on said plank, a boster supported on said springs, a resilient radius member normally extending substantially parallel with said spring plank and consisting of a single member flexible throughout its length, and means for

rigidly connecting said radius member to said bolster and spring plank, respectively, for preventing tilting of said springs when said bolster moves endwise under centrifugal action on rounding curves at high speed.

3. In a railway truck, a truck frame, swing hangers pivotally supported by said frame, a spring plank connecting the lower portions of said hangers and having an elongated slot therein, springs on said plank, a bolster supported on said springs, and a single resilient radius member having its central portion between its ends flexible and having its ends rigidly connected to said bolster and spring plank and movable in said slot when said bolster is depressed.

4. In a railway truck, a frame, a bolster having a rigid downwardly extending projection thereon, springs for supporting said bolster, swing hangers swingingly mounted on said frame, a spring plank supported by said hangers for supporting said springs, and a flexible connection comprising a single bar member having its central portion resilient and having its ends rigidly connected to said projection on said bolster and to said spring plank for causing said bolster and spring plank to swing together whereby tilting of said springs relative to said bolster will be prevented when the bolster moves laterally due to centrifugal force when said truck rounds curves at high speed, said connection engaging said bolster inwardly of the wheels of said truck.

5. In a railway truck provided with rigid side frame members, transoms spaced apart rigidly connecting said members together, swing hangers each comprising downwardly extending arms pivoted at their upper ends to said transoms and movable in the arc of a circle transversely to said frame members, a cross member for rigidly connecting the lower ends of said arms together, a spring supporting member for connecting the lower ends of said hangers together, springs mounted on said spring supporting member, a bolster supported on said springs, and means including a single resilient bar constituting a radius member extending substantially parallel with said spring supporting member and rigidly connected to said bolster and member for causing said bolster and the lower portions of said hangers to swing together and to provide for compression of said springs, said bar being resiliently flexible between its end portions.

6. In a railway truck having a truck frame including transoms extending transversely across said frame, a pair of swing hangers pivotally connected to said transoms, a spring plank connecting the lower ends of said hangers, said spring plank having a slot extending longitudinally thereof, a bolster between said transoms, means including springs between said plank and bolster for supporting said bolster on said hangers, and means independent of said springs for causing the lower portions of said hangers to move laterally of said truck when said bolster moves endwise on said truck, said means comprising a single resilient connector member rigidly attached at its inner end to a projection on said bolster and at its outer end to said spring plank and movable in said slot when said springs and bolster are depressed for preventing a substantial tilting of said springs, said connector member consisting of a single bar resilient and flexible between its attached ends.

7. In a railway truck, side frames having depending pedestals, journal boxes slidably mounted in said pedestals, wheeled axles journaled in said boxes, equalizer bars carried by said journal boxes, resilient means for supporting said frames from said equalizer bars, transoms rigidly connecting said side frames together, a bolster, swing hangers carried by said side frames, a spring plank connecting said swing hangers for supporting said bolster from said frame, said spring plank having an elongated slot therein, springs interposed between said spring plank and bolster, means including a bar connected to said bolster and spring plank and independent of said springs for preventing tilting of said springs relative to the bolster when said bolster moves laterally by centrifugal force in rounding curves, said bar being movable vertically in said slot when said bolster is depressed, and cam means cooperating with cam members on the bearings at one end of said hangers for shortening the effective lengths of said hangers when said bolster swings laterally outwardly of the truck on curves at high speed, said cam means and members being so constructed and arranged that said bolster may have a limited initial endwise movement from normal position prior to the operation of said cam means for shortening the effective lengths of said hangers.

8. In a railway truck, a truck frame comprising side members and transoms connected to said side members, a bolster between said transoms, swing hangers pivoted to said transoms, a spring plank supported on said hangers, a cam connection between said swing hangers and spring plank so constructed that when said spring plank moves endwise outwardly the outer cam connection will rise abruptly after its initial movement, springs for supporting said bolster from said spring plank, and a radius member between said bolster and spring plank and extending longitudinally of said bolster for preventing endwise movement of said bolster relative to said spring plank on rounding curves.

KNUTE EDAHL.