June 25, 1940. W. VAN DER SLUYS 2,205,506

RAILWAY VEHICLE

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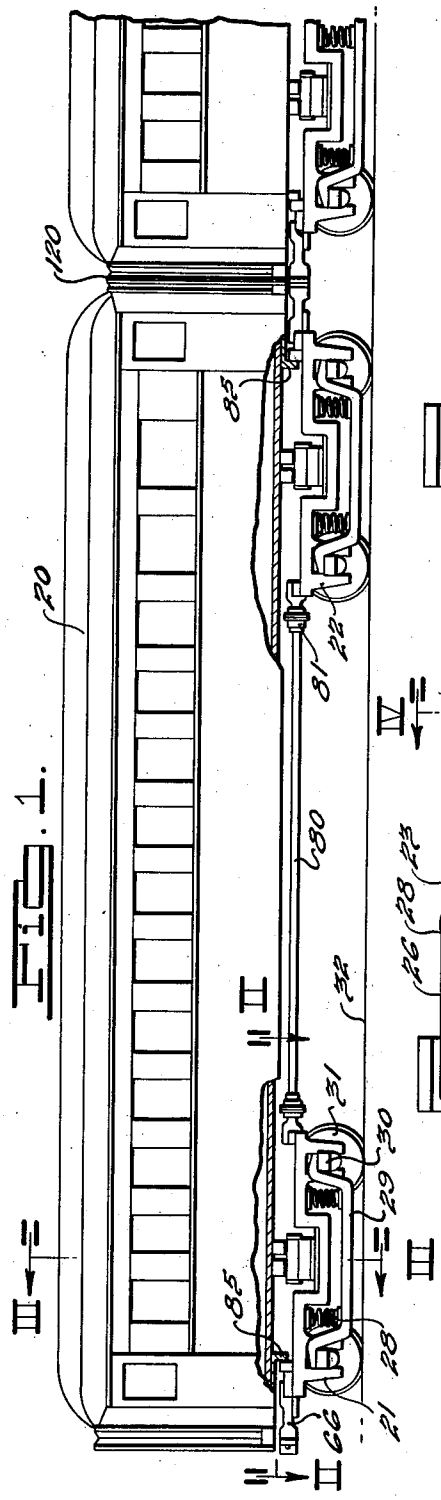


Fig. 1.

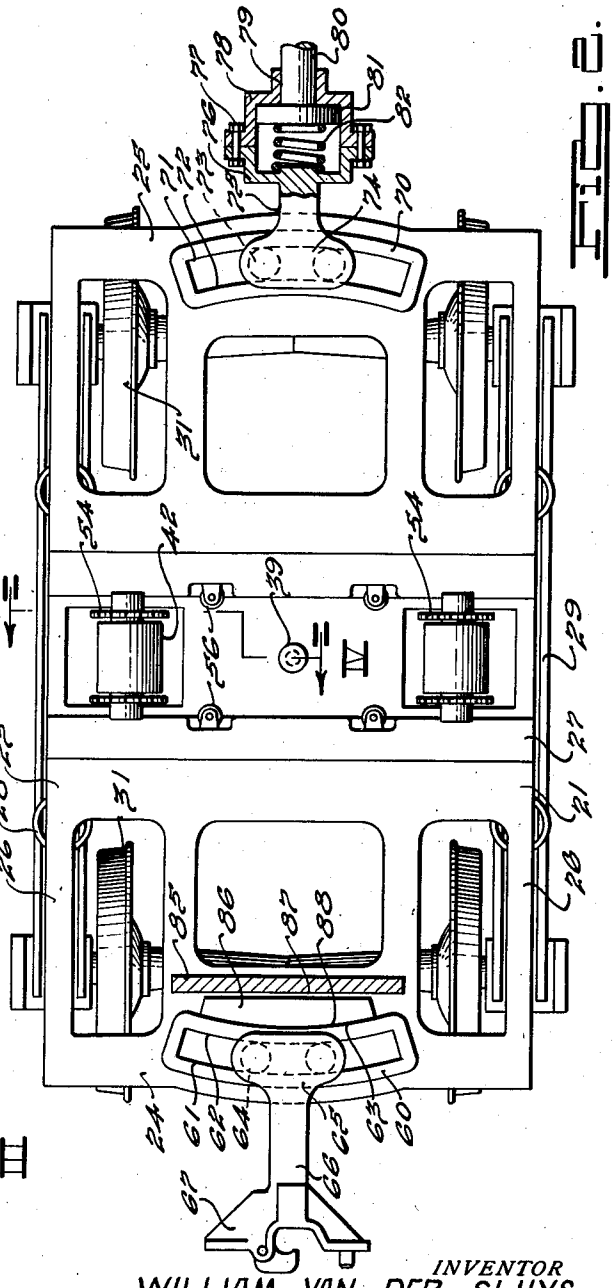


Fig. 2.

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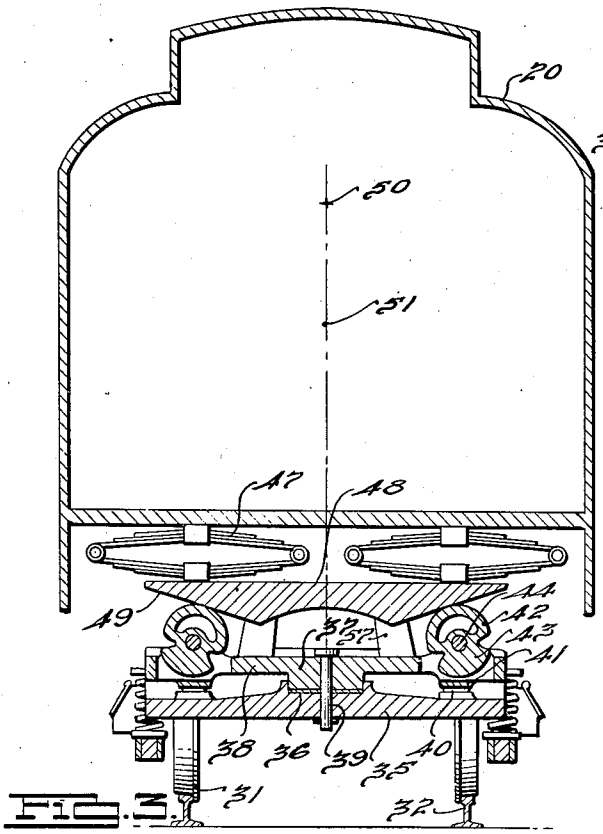


Fig. 3.

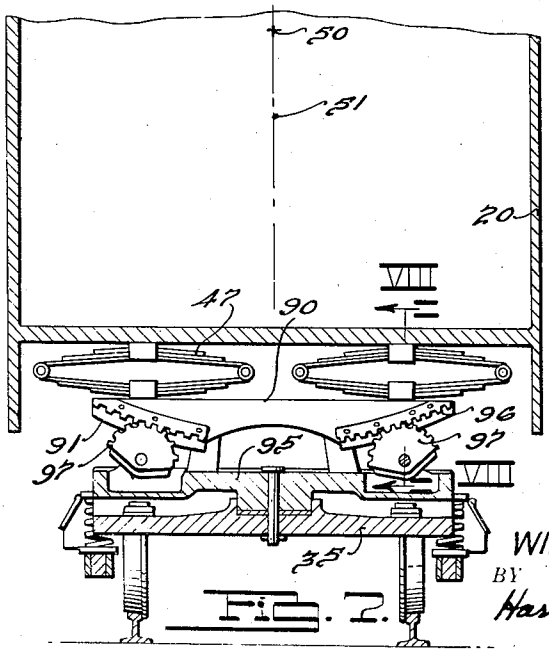


Fig. 7.

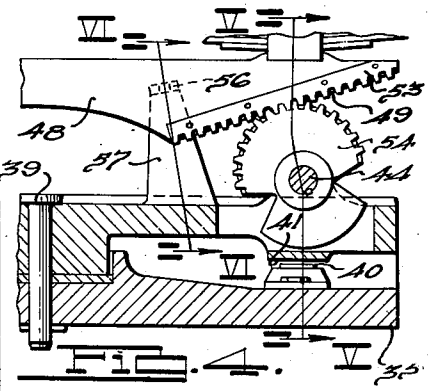


Fig. 4.

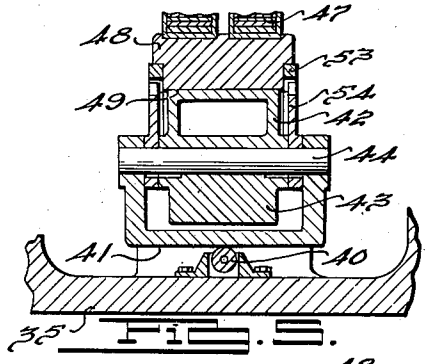


Fig. 5.

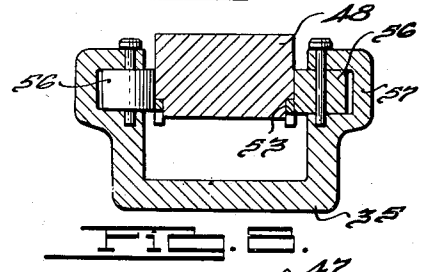


Fig. 6.

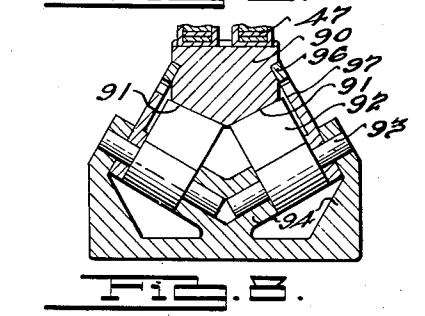


Fig. 8.

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RAILWAY VEHICLE

Filed Nov. 8, 1937 3 Sheets-Sheet 3

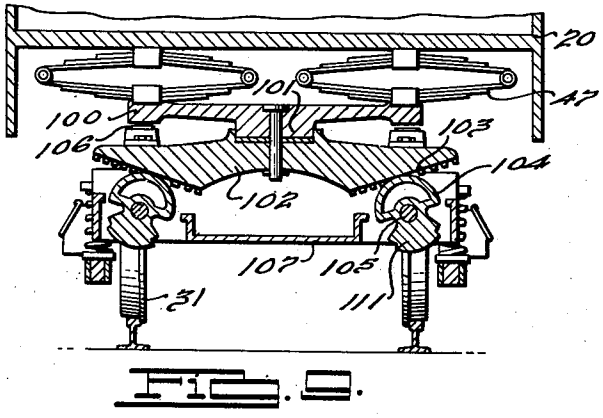


Fig. 9.

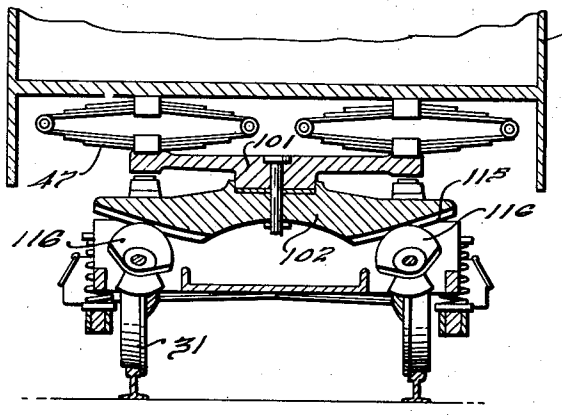


Fig. 13.

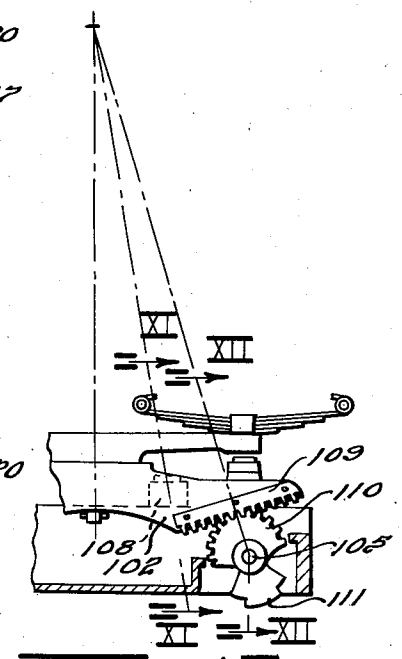


Fig. 10.

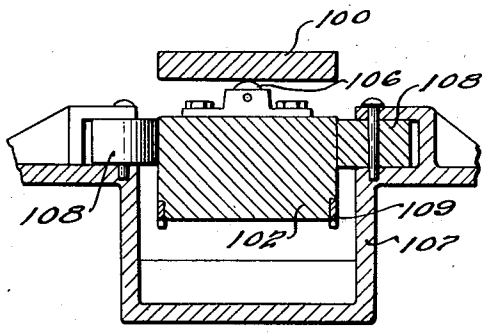


Fig. 11.

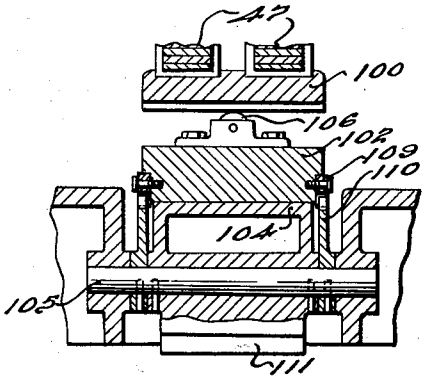


Fig. 12.

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Patented June 25, 1940 2,205,506

UNITED STATES PATENT OFFICE

2,205,506

RAILWAY VEHICLE

William Van Der Sluys, Detroit, Mich., assignor to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware

Application November 8, 1937, Serial No. 173,293

6 Claims. (Cl. 105—199)

My invention relates to vehicles and it has particular relation to vehicles adapted to be drawn or propelled over rails or tracks for the purpose of transporting passengers or merchandise, particularly the former.

Heretofore, some effort has been made, by the designers of railroads, to permit higher speeds of trains operating on tracks by banking the curves in the tracks, that is, placing the outer rail of the curve at a higher level than the inner rail. The banking of the tracks provides a certain amount of neutralizing effect, with respect to the lateral component of centrifugal force, acting on the train while passing around the curve, but, as the degree of banking necessary is dependent upon the radius of curvature of the track and the speed of the train, it is obvious that any banked curve can provide complete neutralization of the unbalancing effect of centrifugal force for only one particular speed of any train. As trains operate over the same track at different speeds, varying from the speed of a slow freight to a fast modern passenger train, and as trains sometimes stop on the curves of the tracks it is apparent that banking of the tracks provides only a partial solution of the problem of neutralizing centrifugal force and, in addition, provides certain disadvantages when the train is stopped on the track.

By my invention I have eliminated all of the shortcomings of banked tracks and have provided means for insuring that each individual car of the train will assume the proper degree of inclination at all times, taking into account the radius of curvature of the track and the speed of each individual train. In addition, my invention compensates for any angle of banking which is improper for the speed of any particular train. It further prevents any undue discomfort on the part of the passengers, or of any injury to produce or merchandise being carried by the train due to shifting thereof, in the event of the train stopping on a curved banked track.

One object of my invention is to improve the riding qualities of railroad cars employed in the haulage of both passengers and merchandise.

A second object of my invention consists in providing means whereby each car body will automatically adjust its angle of inclination with respect to the horizontal to compensate for improperly banked tracks, varying speeds and radius of curvature of the track so as to neutralize the effect of the lateral component of centrifugal force and of uneven tracks on the passengers or on any merchandise being carried in the car body.

An additional object of my invention consists in providing a simple, durable and inexpensive construction for accomplishing the aforementioned objects, which is automatic in operation and substantially trouble-proof throughout its life.

For a better understanding of my invention reference may now be had to the accompanying drawings, of which

Fig. 1 is a side elevational view, partially in section, of one complete railroad car, and a portion of the second car, embodying my invention.

Fig. 2 is a plan view of one of the trucks illustrated in Fig. 1, the view being taken along the line II—II thereof.

Fig. 3 is a cross-sectional view of the structure illustrated in Fig. 1, the section being taken along the line III—III thereof.

Fig. 4 is a detail cross-sectional view of a portion of the structure illustrated in Fig. 2, the section being taken along the line IV—IV thereof.

Fig. 5 is a detail cross-sectional view of the structure illustrated in Fig. 4, the section being taken along the line V—V thereof.

Fig. 6 is likewise a cross-sectional view of a portion of the structure illustrated in Fig. 4, the section being taken along the line VI—VI thereof.

Fig. 7 is a vertical transverse cross-sectional view of a railroad car, quite similar to Fig. 3, illustrating another form which my invention may assume.

Fig. 8 is a cross-sectional detail view of the structure illustrated in Fig. 7, the view being taken along the line VIII—VIII thereof.

Fig. 9 is a vertical transverse cross-sectional view of a railway car, somewhat similar to Fig. 3, of a third form which my invention may assume.

Fig. 10 is a detail view, quite similar to Fig. 4, illustrating portions of the construction embodied in the structure illustrated in Fig. 9.

Figs. 11 and 12 are detail cross-sectional views of the structure illustrated in Fig. 9, the views being taken along lines XI—XI and XII—XII respectively, of Fig. 10.

Fig. 13 is a vertical transverse cross-sectional view of a railway car, quite similar to Fig. 3, illustrating a fourth form which my invention may assume.

In the drawings I have illustrated a railroad vehicle comprising a car body **20** mounted on two spaced supporting trucks **21** and **22**. The trucks **21** and **22** each comprises a frame **23** consisting of a forward end portion **24** and a rear end portion **25**, which are interconnected by side members **26**. The central portion of the truck frame,

including the side members, is depressed as illustrated at 27. The weight of the car body is carried by the truck frame and is transmitted by it to coil springs 28, which, in turn rest upon equalizer bars 29 which serve to transmit the load to journal bearings 30, thence to the wheels 31, to the railroad track rails 32.

As best illustrated in Fig. 3, the depressed central portion 27 of the side members 26 of the frame 24 constitute a truck bolster 35 provided at its central portion with a center bearing 36 on which is pivotally mounted a cooperating bearing member 37 constituting a portion of a body bolster 38. A center pin 39 serves to lock the two cooperative portions of the center bearing together. The truck bolster 35 is provided with the usual roller members 40 which are adapted to engage a cooperating track surface 41 mounted on the bottom surface of the body bolster 37. The roller member 40 normally does not engage the track 41, or engages it very lightly, its primary purpose being to prevent excessive tilting of the body bolster with respect to the truck bolster. Pivotally mounted on the body bolster 38 adjacent each end thereof is a cam member 42 provided, on one side, with a counter weight 43. The surface of the cam member 42 is circular or cylindrical but the supporting pivot pin 44 is disposed slightly off center for a purpose to be hereinafter described.

The car body 20 is mounted upon two full elliptical leaf springs 47 which in turn rest upon a supporting member 48, provided on its under side with two spaced straight track members 49, which are inclined with respect to the horizontal and with respect to each other, the inclination of the track members being opposite on opposite sides of the center line of the car body. The straight track surfaces 49 rest upon the cylindrical surface of the cam members 42, and the weight of the car body is thus carried by the truck frame through the cams 42. The track surfaces 49 are disposed at such inclination that lines drawn normal to each of them and bisecting each of them will meet at a point 50 in the vertical center plane of the car body 20 above the axis 51 representing the longitudinal axis through the center of gravity of the car body.

As the car passes around a curve in the railroad track a centrifugal force is exerted on the car body causing the center of gravity thereof to tend to move outwardly of the curve. When this occurs the tracks 49 roll on the cam members 42 in such manner as to move the lower part of the car body outwardly with respect to the curve of the tracks, and the top part inwardly with respect thereto, the movement of the car body being about the point 50 as an axis, which movement is insured by the shape of the cam surface 42. The surfaces 49 being perfectly flat are readily machinable as are the surfaces 42 of the cam members on which these tracks roll. With this arrangement the car body will tilt in passing around the curve on a track in proportion to the radius of curvature of the track end and to the speed of the car so that no unbalancing effect due to the lateral component of the centrifugal force is noticeable to any passenger riding in the car, and liquids and the like contained in vessels disposed within the car will remain parallel with respect to the tops thereof, thus preventing spillage. As the position of the car on the cams 42 is determined by a combination of the weight thereof and the lateral component of the centrifugal force, it will be apparent that if the car should stop or pass very slowly around a banked track, the car body will automatically assume a position which is either horizontal or very nearly horizontal, in the event of slow speeds, thus compensating for the banking of the track to a degree unsuitable for slow speed or stoppage.

I have found that with the track surfaces 49 straight and the cams 42 circular and pivoted about the axis of that curve the motion of the car body, when the tracks roll on the cams 42, is not a true circular movement and does not permit movement of the car body to compensate entirely for the lateral component of the centrifugal force. However, if the members 42 are caused to move about axes disposed slightly off center with respect to the center of the circular surfaces the resulting movement of the car body will be so near to a truly circular movement as to defy detection however carefully observed.

In order to prevent slippage of the tracks 49 on the cam 42 or misalignment thereof I have provided a toothed rack member 53, as best shown in Fig. 4, mounted on the side of the track portion 49 and a toothed gear 54 secured to the side of the cam member. These racks and pinions may be secured to both sides of the body bolster 48 and the cams 42 so as to insure proper relative movement between the two surfaces at all times.

Owing to the fact that there is a tendency for the supporting member 48, and therefore the track 49, to move forwardly with respect to the cam 42 when the brakes are applied, or to move rearwardly with respect thereto when the car is being accelerated, I have provided roller member 56, as best shown in Fig. 6, which are rotatably journaled in arms 57 secured to the sides of the bolster member 35 and projected upwardly therefrom so that the roller members 56 may freely engage at all times the sides of the body bolster 37.

In a construction of this character it is necessary that each car body move freely with respect to the truck frame and independently of the adjoining car bodies. For this reason it is necessary that all tensional and compressional forces be transmitted throughout the train independently of the car bodies. In order to provide this type of arrangement my construction provides that all forces transmitted through the trucks and running gear independently of the car body excepting under very unusual circumstances.

Mounted on the forward end 24 of the truck frame 21 is a guide member 60 which is fastened to the upper surface thereof. The guide member 60 consists of a hollow frame member having an interiorly facing arcuate face 61, an exteriorly facing arcuate surface 62 and a second interiorly facing arcuate surface 63. Disposed between the faces 61 and 62 are two roller members 64, which are slightly smaller in diameter than the distance between the faces 61 and 62, and which are journaled upon the supporting members 65. The supporting member 65 has secured thereto a drawbar 66 on which in turn is mounted a coupling member 67. The coupling member 67 is preferably of the rigid variety so that when secured to a corresponding coupling member both coupling members and draw bars constitute a rigid non-bendable unit.

The faces 61, 62 and 63 represent arcs drawn about the axis of the center bearing 36, and therefore the axis of the center pin 39, as an axis. The roller members 64 are free to roll upon the surface 61 in the event that tension is placed

on the drawbar 66 or on the surface 62 in the event that compressional forces are being transmitted thereby. Regardless of the position of the supporting member 65 on the guide member 60 it will always point toward the center pin 39 so that all forces transmitted therethrough will have an effective point of application at the center of the center bearing. As a result, the drawbar 66 and the drawbar of an adjoining car to which it is connected will always lie in a straight line between the center bearings of the two trucks which they connect regardless of the relative angularity of the truck frames with respect to their associated car bodies.

In like manner, I have secured to the rear end of portion 25 of the front truck a similar guide member 70 having corresponding arcuate faces 71 and 72 between which are loosely mounted roller members 73 journaled in a supporting frame 74 on which is mounted a short drawbar 75. The drawbar 75 has mounted on its end a cup-shaped member 76 to which is secured by bolts 77, or other suitable means, a correspondingly shaped cup member 78 provided with a centrally disposed opening 79 within which is slidably mounted a beam 80. Secured to the end of the beam 80 is a piston member 81, which moves within the two cup-shaped means 76 and 77 as a cylinder, and which is retained normally in spaced relation with the end of the cup-shaped member 76 by means of a compression spring 82, which may be pre-loaded to any desired degree. The beam 80 extends lengthwise of the car body and is secured through a corresponding piston member 81 to the front end of the rear truck on which is mounted an arcuate guide member 70, the arcuate faces of which represent fragmentary cylinders drawn about the center bearing of the truck on which they are mounted as axes. The rear end of the rear truck 22 is provided with an arcuate guide member, drawbar and coupling similar to that described in connection with that of the front end of the front truck so that connection to the front end of the next adjoining car may be effected therethrough.

On the ends of the car bodies I have mounted a stop member 85 which is secured to and projects downwardly from the floor of the car body or the center beam thereof. Disposed intermediate the stop member 85 and the inner face 63 of the arcuate guide member 60 is disposed a floating block 86 the inner face 87 of which is perfectly flat and vertical so as to flatly engage a corresponding face on the stop member 85. The outer face 88 of the block 86 is arcuate in contour so as to correspond with the inner face 63 of the guide member 60. Both faces are ground and may be lubricated as desired. The lower face of the stop member 85 may be of any desired shape but is preferably arcuate, representing an arc drawn about the tilting axis 50 of the car body so that regardless of how the car body tilts with respect to the frame in passing around curves in the track and the like the lower face of the track 85 will not engage any portion of the truck frame.

With this construction, when tensional forces are placed on the drawbar 66 they are transmitted thereby to the rollers 64 and through the guide member 60 to the face 61 on which the rollers are free to move. From the guide member 60 the forces are transmitted to the truck frame 23 on which it is mounted and thence to the rear end 25 of the truck frame 23. From the rear end of the truck frame the forces are transmitted to the guide member 70 and thence to the rollers 73. From the roller 73 the forces are transmitted to the short drawbar 75 and thence to the cup members 76 and 77 to the piston 81 and thence to the beam 80. From the beam 80 the tensional forces are transmitted directly to the front end of the frame of the rear truck through a corresponding piston and cylinder mechanism 81 thence to the rear end of the truck frame to the drawbar and coupling there located to the front truck of the adjoining car. It is thus apparent that tensional forces may be transmitted through the vehicle without being imposed upon the car body and the car is free to move upon its springs 47 or to rotate upon the cam members 42 in response to centrifugal forces being exerted thereon.

The car body receives its forward impetus when the trucks are moved forward as described through the springs 47 from the supporting member 48 which is maintained in position on the body bolster 38 by the arms 57 and rollers 56. In the event that the tensional forces exerted therethrough are comparatively high an undue longitudinal stress may be exerted upon the lateral springs 47 and to prevent any injury thereto the stop members 85 are disposed relatively close to the floating blocks 86 at each end of the car body so that after the springs have been distorted slightly the stop member 85 at the rear end of the car will come into contact with the floating block there located and assume any additional force there located to move the car with the moving trucks.

When compressional forces are being transmitted through the running gear of the vehicle a corresponding transmission of forces occurs except that the roller members 64 engage the inner face 62 of the guide member 60 to transmit the compression to the truck frame, and the roller members 73 engage the inner face 72 to transmit the compressional forces through the short drawbar 75. Through the cup member 76 the compressional forces are transmitted to the beam 80 through the compression spring 82 and the piston 81. From the beam 80 it is transmitted through a compression spring located in the cylinder member 81 at the front end of the rear truck, thence through the rear truck frame to the drawbar and coupling member there located.

It is apparent from this description that compressional forces are transmitted in the same manner as tensional forces except that the two sets of compressional springs 82 enter into the force transmitting mechanism. The purpose of this inclusion is to prevent subjecting the beam 80 to forces beyond which it is designed to carry but to enable the beam 80 to carry all ordinary or moderate compressional forces. In the event that the compressional forces become excessive the piston 81 moves within the cylinder against the action of the compression spring 82 thus permitting the floating block 86 to engage the stop member 85 at the front end of the car body and permits a corresponding engagement between the stop member 85 at the rear end of the car and its cooperating floating block so that any forces in excess of those properly carried by the compressional spring 82 are assumed by the car body itself. The springs 82 are so designed that all forces are carried thereby under practically all conditions with the exception of exceptionally large compressive forces so that the time during which the stops 85 are in contact with the blocks

86 is an extremely small percentage of the total operating time.

Free movement of the trucks with respect to the car body is permitted even during the period when the blocks 86 are in contact with the stop members 85 because, with the contacting surface ground and well lubricated, rotation of the trucks about their center bearings is permitted by corresponding movement between the face 63 of the guide member 60 and the face 88 of the block 86, and vertical or tilting movement of the car body about its tilting axis is permitted by relative movement between the flat vertical face 87 of the block 86 and the cooperating flat face of the stop member 85. In this connection it should be noted that I desire to have the drawbar 66 of such length as to positively prevent contact of the ends of adjacent car bodies as I have found that all forces transmitted between car bodies of this nature are of a particularly disturbing type. Also, the ordinary friction gear now used in drawbars may be mounted in the drawbars 66 if so desired but constitute no part of this invention.

In the construction illustrated in Figs. 7 and 8 the car body 20 rests upon the car body springs 47 which in turn rest upon a supporting member 90. The supporting member 90 is provided at its lower face with two arcuate tracks 91 which are angularly related, in longitudinal vertical cross-section, as best illustrated in Fig. 8. Viewed longitudinally of the car these tracks 91 represent a surface of revolution drawn about the axis 50, which is the tilting axis of the car body, and which is located above the axis 51 representing the center of gravity of the car body. The tracks 91 rest upon roller members 92 provided with shafts 93 which are journalled in supporting arms 94 mounted on a body bolster 95, which, in turn, is provided with a center bearing resting upon the truck bolster 35 as described in connection with Fig. 3. By reason of the angularity of the two track surfaces 91 any tendency for the body to move longitudinally with respect to the truck frames necessitates raising of the weight of the body up the inclines represented by the faces of the rollers 92 and thus prevents such movement. This eliminates the necessity for supporting arms 57 such as are illustrated in Fig. 4.

The surfaces of the roller members 92 are disposed at an angle to the axes 93 in order to conform with and move throughout all points at the same peripheral speed as do the various contacting portions of the track surface 91. The supporting pins 93 are inclined at such angle that their axes will intersect the axis 50 so that tilting of the car body about the axis 50 is permitted without any slippage between the surface 90 and the face of the rollers 92.

In order to prevent any misalignment of these surfaces an arcuate rack 96 is secured to the sides of the supporting member 90 and toothed gears 97 are mounted on each of the rollers 92 to cooperate with the aforementioned rack. The roller members 92 may be complete annuli or they may be segmental as shown, this being determined by the length of the tracks 91 in comparison with the radius of the roller members 92.

I have found that railroad cars, in tilting to the desired angle at high speeds and around sharp curves, rarely tilt beyond six degrees from the vertical and never tilt beyond eight degrees from the vertical on any type of tracks as employed at present. I have found it desirable to employ fairly large roller members owing to the rather high line forces exerted thereon by the weight of the railroad cars and, as a result, with the limited movement necessary for the proper correction of the lateral unbalancing effect of centrifugal force and with relatively large rollers employed less than half of the circumference of the roller would be used to contact the track and, as a result, complete annuli are unnecessary. If smaller rollers were employed complete annuli would be desirable.

With this construction, as the car passes around a curve in the railroad tracks the centrifugal force acting upon the center of gravity 51 causes a movement of the lower part of the car body outwardly of the curve about the point 50 as an axis, which is determined by the degree of curvature of the arcuate tracks 91. When this occurs the tracks roll upon the roller members until the body has reached a state of equilibrium under which conditions the passengers will not be conscious of any unbalancing effect caused by the train passing around the curve. In like manner, if the car stops on a banked track the tracks will move slowly toward a position wherein the car body is vertical, the movement being very slow as the car decreases in speed until it has reached a position where the car body is vertical when the train is stopped. This is due to the fact that the unbalancing effect of the centrifugal force gradually decreases and the point 51 will move to a position directly beneath the axis 50 at all times when no centrifugal force is acting on the car body.

In the structure illustrated in Figs. 9 to 12, inclusive, the car body 20 is mounted on springs 47 which in turn rest directly on a body bolster 100, the bolster 100 being provided with a center bearing 101 by means of which it rests upon and is pivotally supported upon a truck bolster 102. The truck bolster 102 is provided with straight inclined track surfaces 103 which rest upon cams 104 similar to the straight track surfaces and cams described in connection with Fig. 3. The cams 104 are pivotally mounted upon the truck frame by means of pivot pins 105 and excessive tilting of the car bolster 100 with respect to the body bolster 102 is prevented by roller members 106 of the type generally employed for this purpose. Movement of the truck bolster 102 longitudinally of the truck frame 107 is prevented by roller members 108 journalled to the truck frame as described in connection with Fig. 6 which rollers lightly engage the truck bolster 102 at all times, as best illustrated in Fig. 11. The tracks 103 are provided with toothed racks 109, as best shown in Fig. 10, and the cam surface 104, which is cylindrical in contour but provided with an off center supporting pin or axis, is provided with a toothed gear 110 adapted to mesh with the rack 109 and prevent movement of the one surface without corresponding movement of the other surface. The cams 104 may be provided with balanced weights 111 if desired.

In the structure illustrated in Fig. 13 the car body 20 is mounted upon a body bolster 101 which in turn is pivotally mounted upon a truck bolster 102, as described in connection with Fig. 9. The truck bolster 102 is provided on its lower surface with angularly inclined track members 115 which in turn rest upon two sets of angularly inclined roller members 116, the track members 115 and 116 being similar to the members 91 and 92, respectively, as described in connection with Figs. 7 and 8. In this instance the axis about which the arcs of the surfaces 115 are

drawn is the same axis 50 about which it is desired to have the body tilted to counteract the effect of the lateral component of the centrifugal force acting on the car in passing around curves in the track. The track 115 and the roller 116 may be provided with the usual rack and gear mechanism associated therewith as described in connection with other figures of the application to prevent other than pure rotative movement between the surfaces of these two members.

In accordance with my desire to prevent the transmission of any forces from one car body directly to the other car body I prefer that the bodies be interconnected by a vestibule bellows 120 of such type that no forces either vertical, lateral or tilting may be transmitted thereby.

Although I have illustrated several forms which my invention may assume and have described in detail several applications thereof it will be apparent to those skilled in the art that it is not so limited but that various modifications and changes may be effected therein without departing from the spirit of my invention or from the scope of the appended claims.

I claim:

1. In a railway vehicle, two spaced trucks each provided with a truck frame and a truck bolster supported on said frame, a body bolster pivotally mounted on said truck bolster, cam members rotatably journaled on said body bolster, and a car body provided with longitudinally spaced transversely extending supporting members adapted to support the weight of the car body, said supporting members being provided with a straight downwardly facing track portion on each side of the centerline of said car body, said straight track portions being adapted to rest and roll on said cam members, said cam members having a surface contour adapted to compensate for the departure of said straight track portions from a true arc about a predetermined point within said car body.

2. In a railway vehicle, two spaced trucks each provided with a truck frame and a truck bolster supported on said frame, a body bolster pivotally mounted on said truck bolster, circular cam members having off-center axes rotatably journaled on said body bolster, and a car body provided with longitudinally spaced transversely extending supporting members adapted to support the weight of the car body, said supporting members being provided with straight inclined downwardly facing track portions, said track portions being oppositely inclined on opposite sides of the centerline of said car body and said inclined portions being adapted to rest on said cams and to roll thereon under the influence of centrifugal force acting on said car body, said cam members having an effective surface contour adapted to compensate for the departure of said straight track portions from a true arc about a predetermined point within said car body.

3. In a railway vehicle, two spaced trucks each provided with a truck frame and a truck bolster supported on said frame, a body bolster pivotally mounted on said truck bolster, a set of two angularly related roller members rotatably journaled on each end of said body bolster, a car body provided with longitudinally spaced transversely extending supporting members adapted to resiliently support the weight of the car body, said supporting members being provided with two angularly disposed track portions adapted to rest and move upon said angularly related roller members, said truck portions representing surfaces of revolution drawn about an axis extending longitudinally of the car body above the center of gravity thereof.

4. In a railway vehicle, two spaced trucks each provided with a truck frame, circular cam members having off center axes rotatably journaled on said frame, a car body provided with two longitudinally spaced body bolsters, a truck bolster pivotally associated with each of said body bolsters and adapted to support the weight thereof, said truck bolsters being provided with a straight downwardly facing track portion on each side of the center line of said car body, said straight track portions being adapted to rest and roll on said cam members under the influence of centrifugal force acting on said car body.

5. In a railway vehicle, two spaced trucks each provided with a truck frame, circular cam members having off center axes rotatably journaled on said frame, a car body provided with two longitudinally spaced body bolsters, a truck bolster pivotally associated with each of said body bolsters and adapted to support the weight thereof, said truck bolsters being provided with a straight downwardly facing track portion on each side of the center line of said car body, said straight track portions being adapted to rest and roll on said cam members under the influence of centrifugal force acting on said car body, and means for preventing movement of said cam or track member without corresponding movement of the associated member.

6. In a railway vehicle; two trucks spaced from each other longitudinally of the vehicle, each of said trucks comprising a frame and rail-engaging wheels carried thereby; a vehicle body; a pair of supports spaced from each other longitudinally of the vehicle and respectively associated with said trucks for transmission of body load thereto; spring means intermediate said body and supports; means mounting said supports on said truck frames respectively such that said body, spring means, and supports are capable of lateral swinging movement as a unit relative to said truck frames approximately about an axis extending longitudinally of the vehicle; means accommodating pivoting of each of said truck frames about a vertical axis relative to the support associated therewith; vehicle draft means operably connected to said truck frames; and draft-transmitting means connecting said trucks together; said draft means and draft-transmitting means being adapted to transmit the vehicle draft forces from one end of the vehicle to the other through said truck frames independently of said body.

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