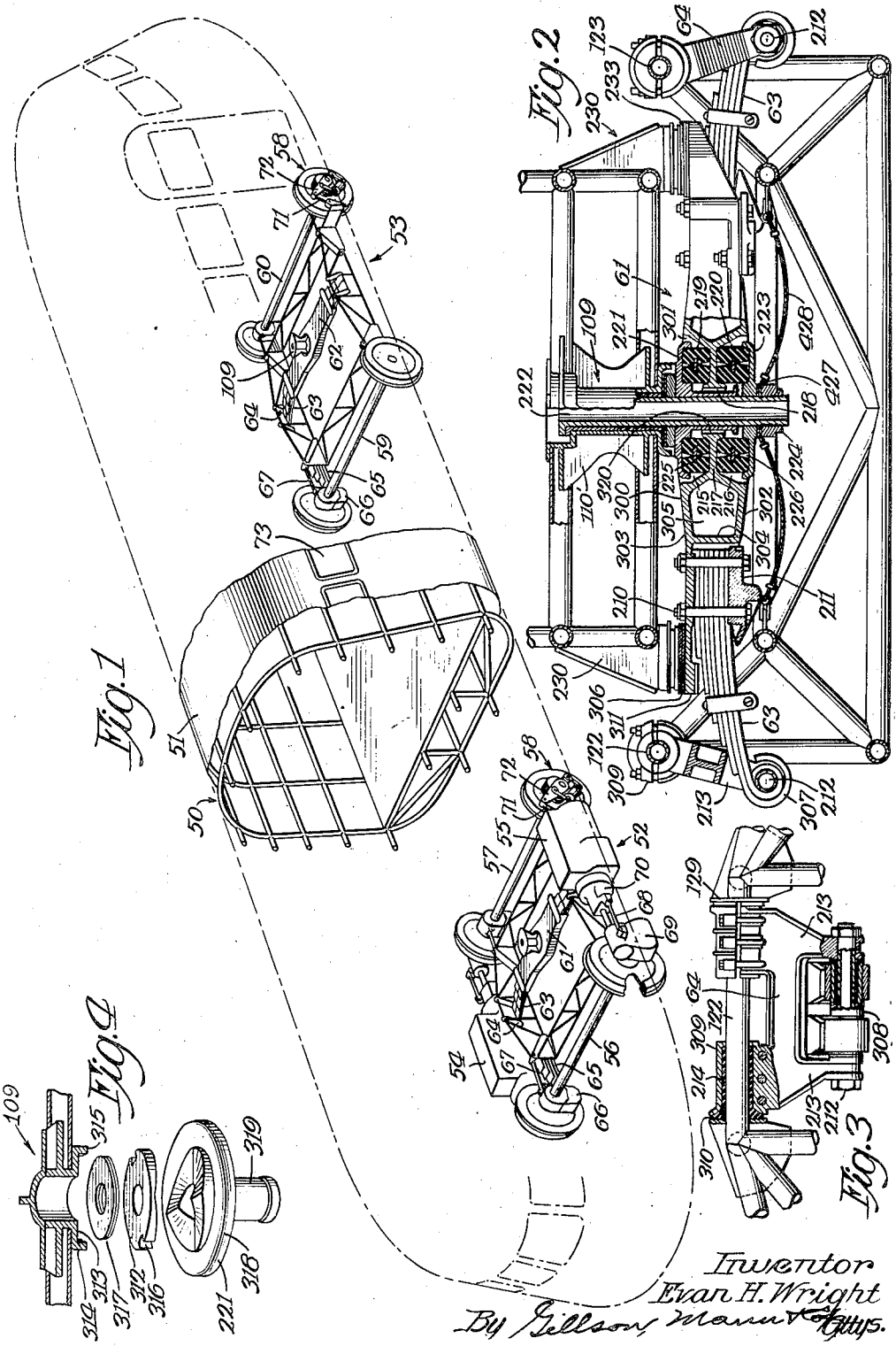
Oct. 6, 1936. E. H. WRIGHT 2,056,222

SIDE BEARING FOR RAILWAY CARS

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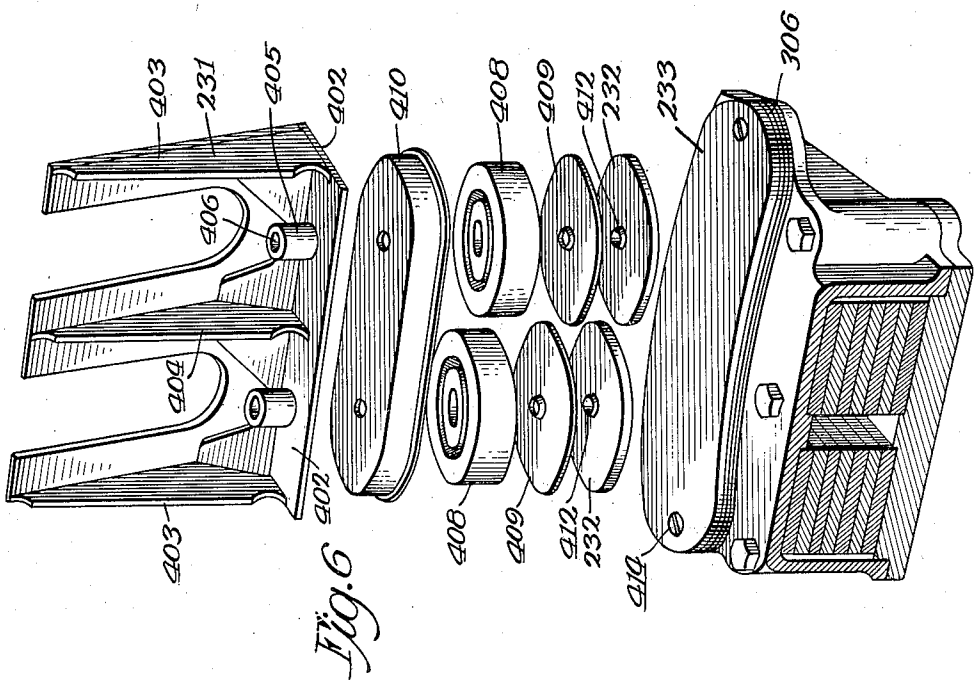


Fig. 6

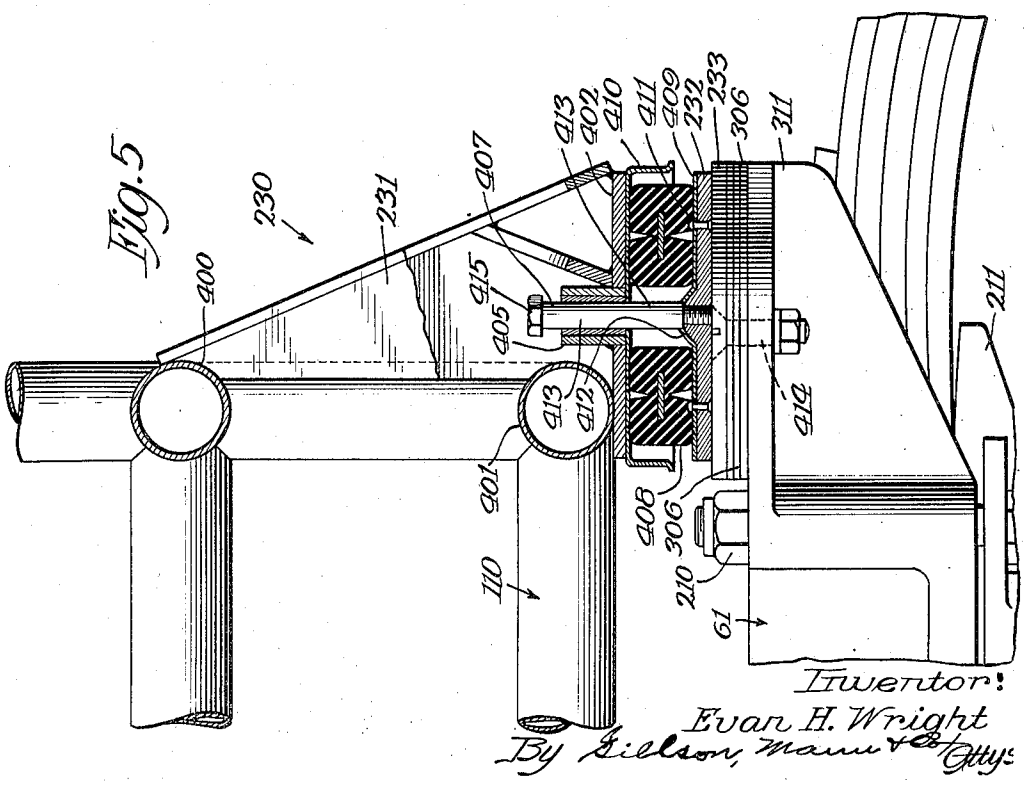


Fig. 5

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SIDE BEARING FOR RAILWAY CARS

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8 Claims. (Cl. 308—138)

The general trend in the fields of air, land and water transportation toward greatly increased speeds has brought about a demand for rail cars which are much faster than those now in use. But to obtain high speeds in railway transportation consistent with safety and economy, the entire organization of the conventional railway car must be altered to meet the new conditions of service.

Light weight is one of the essentials of any car that is capable of traveling at relatively high speeds, for excessive weight requires additional power and there is no power to be wasted if speed is to be obtained.

Air resistance becomes an important factor in dealing with high speed cars. It is important not only as it impedes forward movement of the car, but also as it affects the stability of the car on the track.

In a broad sense, this invention has for its primary object to provide a rail car of a given load capacity, lighter without loss of strength and shock resistance, and faster with less power as compared with prior cars, and also able to hold the track in spite of the greater relative wind velocity at angles to the line of travel which arise from the increased speed, all with appropriate cost, and otherwise suited to existing conditions.

Generally speaking lightness with ample strength is obtained:

First: By using tubes for all structural members and welding for all joints, whereby the metal is used to the greatest advantage and heavy joint fittings and localized strains are obviated, and the whole body is made one coordinate entity; and

Second: The motors and other weighty elements of the operating mechanism are mounted close to the rails and the parts to be driven or stopped, whereby the body, the center bearing, the side bearings, and all other parts in the line of force transmission, are relieved of much strain and may be made correspondingly lighter.

Being lighter, less power can handle the car, as well as its best predecessor but, in addition, the air resistance (which increases rapidly with the speed, other things remaining the same) is tempered by lowering the car and reducing or eliminating suction areas, vortexes or whirls and reverse turbine effects between all parts of the car, the track and other stationary objects, whereby the speed can be increased out of all proportion to the power and speed of the past.

The greater speed increases the transverse component of all wind resistance (and with conventional forms would increase the resultant suction effects) and there would be greater tendency to overturning which the lighter weight would be less able to resist, but for the fact that the wind is passed easily and smoothly under and over the car and the flat upright surfaces are reduced to a minimum, whereby the pressure on the leeward side is kept close to that on the windward side.

In a narrower sense, the purpose of this invention is to provide a side bearing construction that is particularly suitable for use with a car having the above characteristics, and which in addition will give long years of useful service, will effectively limit side sway of the car body without transmitting vibration and noises from the truck to the body, and which is self lubricating so that little or no maintenance is required.

Further and other objects and advantages will become apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawings, in which

Fig. 1 is a diagrammatic, perspective view showing the general organization of a car made in accordance with this invention;

Fig. 2 is a view, partly in section and partly in elevation, showing the spring bolster assembly;

Fig. 3 is an end elevational view showing the means for supporting the bolster on the truck frame;

Fig. 4 is an exploded, perspective view of a portion of the center bearing assembly;

Fig. 5 is an enlarged, detailed, longitudinal view of the side bearing, a portion being broken away to expose the parts in rear; and

Fig. 6 is an exploded, perspective view of the side bearing assembly.

At the outset, it should be understood that the selection of certain preferred and modified forms of the invention for illustration and description is merely for the purpose of disclosure, for the invention may be variously embodied within the scope of the appended claims. Limitations, therefore, are not to be read into the claims unless required by the prior art.

General organization (Fig. 1)

The illustrative embodiment of the invention, which is shown in diagrammatic perspective in Fig. 1, clearly shows the application of the several fundamental concepts mentioned above to the general organization of the car.

The car body, it will be observed, comprises a space framework 50 of metal tubing that is welded together to form a rigid unitary body. The

framework is covered by a metal skin 51 which is secured to the framework and assists in resisting tortional strain.

The body is supported by a front truck 52 and a rear truck 53, the former having internal combustion engines 54 and 55 mounted outboard on opposite sides of the truck. The front truck includes wheeled axles 56 and 57, diametrical ends of which are driven by the motors 54 and 55. The other diametrical ends of the axles 56 and 57 are equipped with brake operating mechanism, generally indicated at 58.

The rear truck 53 includes wheeled axles 59 and 60, each of which are braked by mechanism corresponding to the mechanism 58 of the front truck.

The axles of both front and rear trucks are equipped with what may be termed "resilient" wheels, and this term is intended to include all forms of wheels which are inherently resilient either by the interposition of rubber under shear, pneumatic tires, springs, or by any other means.

The car body rests upon spring bolsters 61 and 62 of the front and rear trucks, respectively, and, preferably, the bolsters are equipped with cantilever springs 63 which are shackled to swing hangers 64 pivotally suspended from the truck frames.

The truck frames of each truck are fabricated of metal tubing welded together in such manner as to produce space frameworks of necessary strength, and at the four corners of each frame, a leaf spring 65 projects toward the adjacent axle where it connects to a journal 66. The point of connection between the projecting spring and the journal, is underslung with respect to the axles.

Driving and braking forces applied to the car axles are transmitted to the truck frames by radius rod 67. Other radius arms 68 which connect the worm gear casing 69 to a fixed point on the car truck,—in this case, the transmission housing 70,—take the thrust of the driving worm. Braking forces are resisted by torque arms 71 which connect the brake housing 72 to the truck frame.

The car body, it will be seen, is elongated and has a tapering blunt nose and tail to reduce wind resistance. The outer surface of the car consists of smooth broad curves well blended together to product a graceful appearance and at the same time directing the air currents around the car with minimum effort. The windows 73 are flush with the outer skin, and are made stationary as it is contemplated that a forced system of ventilation will be used.

The bottom of the car is uninterrupted in outline except for the wheels of the truck which project through the metal skin enveloping the body framework.

Swing bolter assembly

The swing bolster assembly shown in Figs. 2 and 3 is the same for both front and rear trucks, and for convenience, the showing in these figures will be considered as illustrating the bolster assembly of the front truck.

The bolster 61 comprises a hollow casting 300 having an enlarged central portion 301 provided with circular depressions 215 and 216 on its upper and lower faces, respectively. The dividing wall 217 between the two depressions forms an annular ledge which is substantially half way between the top and bottom walls of the bolster. The inner margin of the ledge is enlarged, as indicated at 218 to form a wearing surface for the center bearing assembly.

The bottom wall 302 of the bolster is joined to the top wall 303 by an intermediate vertical wall 304 leaving suitable openings at the bottom of the bolster for inserting the springs 63 at each end thereof.

Two quarter-elliptical springs are mounted in the recesses at the ends of the bolster and are clamped in place by bolts 210 which draw retaining plates 211 tightly against the bottoms of the spring.

The bolster is cored out wherever possible as, for example at 305, to reduce weight. The ends of the bolster are slightly enlarged to receive arcuate chrome-plated steel plates 233, which cooperate with the side bearings 230 on the car body. The plates 233 are suitably spaced from the bolsters by shims 306.

The ends of the spring 63 are provided with double eyelets 307 adapted to engage a bolt 212 which joins adjacent arms 213 of the spring hanger 64. In case the bottom leaf of the spring breaks, the adjacent leaf will support the spring on the spring hanger.

Each of the swing hangers 64 consists of a casting having depending arms 213 through the ends of which the bolt 212 is adapted to pass. The two springs suspended from each hanger are separated by a spacer 308 telescoped on the bolt.

The upper ends of the swing hangers 64 are bifurcated and are adapted to be pivotally clamped to the bearings 122 and 123 by bearing caps 309. Rubber bushings 214 interposed between the swing hanger bearings and the tubular bearing supports 122 and 123 resist side sway of the car body by being placed in shearing strain. The bushings are enlarged as indicated at 310 to bear against the disks 129 and cushion the truck frame from side thrusts.

The extreme ends 311 of the bolster are so spaced with reference to the springs 63 that when the car body tilts one way or the other beyond a given angle the end of the bolster forms a new fulcrum for the springs with shorter leverage. This arrangement assists in preserving the life of the springs.

The bolts 212, which connect the arms 213 of the swing hanger casting, are fitted with self lubricating bushings, so that proper lubrication is provided for the ends of the spring. These bushings are made of a tough, wear and pressure resistant, porous material impregnated with oil and known to the trade as "Oilite." Since the details of this self-lubricating bearing constitute no part of the present invention, it is not thought necessary to further illustrate or describe the same.

Lateral travel of the swing bolster is limited by cables 428, which extend between the cable anchors 427 on the bottom of the bolster and adjacent joints on the truck frame.

Center bearing

In conventional center bearing constructions, the car truck is swiveled to the body by a center pin which passes through the body bolster and the truck bolster, and the weight of the body is carried by some kind of an anti-friction device that is interposed between the truck and body center plates. In the present invention, there is no body bolster, but instead, the center pin passes through a collar 109 welded into the understructure of the car body, and through a semi-floating truck center plate which is adapted to

absorb much of the vibration and noise that is ordinarily transmitted from the truck to the car body.

The center bearing assembly is best shown in Figs. 2 and 4 and comprises essentially a body center plate 312, a truck center plate 221, two rubber annuli 219 and 220, a retaining cap 223 and a center pin 222 which receives a nut 224 on its lower end.

The collar 109 which is provided with laterally extending reinforcing ribs 110' has a round bottom face 313 which is flanked by a downwardly extending flange 314. At one or more points on the flange 314, a lug 315 is provided which is adapted to engage a cut-away portion 316 in the body center plate 312. The outside diameter of the body center plate corresponds to the inner diameter of the flange 314 so that the former fits snugly within the bottom of the collar 109 and is held against rotation by the lug or lugs 315. Shims 317 are provided for adjusting the height of the car body with reference to the truck bolster, as this is necessary to enable the side bearings 230 to function properly.

The truck center plate 221 is more or less mushroom shaped and has a flange 318 adjacent its top which is adapted to seat upon the rubber annulus 219 in the top cavity 215. The shank 319 of the center plate extends through the opening 320 in the truck bolster, but normally does not contact with the wear surface 216. The truck center plate is clamped in place by retaining cap 223 which engages the underside of the annulus 220 and forces it against the annular ledge 217. A nut 224 which screws upon the center pin 222 holds the parts in assembled relation.

The customary use of roller or ball bearings between the truck and center plates is rendered unnecessary in the present construction: First, because the car body is extremely lightweight; and secondly, because the body center plate 312 is made of a self-lubricating material known to the trade as "Oilite". This material not only eliminates the necessity for lubrication, but in addition is extremely tough and wear resistant.

The contacting surfaces of the body and truck center plates are cut with complementary double helical surfaces, as shown most clearly in Fig. 4, in order to normally maintain the car truck in alinement with the car body. When a car is travelling at high speeds, there is a tendency for the truck to weave in and out between the rails of the track, thereby causing danger of derailment and wear on the wheel flanges. By providing the mating faces of the truck and body center plates with complementary surfaces, as shown in Fig. 4, any tendency of the truck to turn with reference to the car body is resisted by the weight of the car, for any relative rotation between the truck and the body slightly lifts the latter and is opposed by gravity.

The truck center plate 221 which is resiliently supported by the annulus 219 is capable of limited movement from its normal vertical axis and is fully insulated from the car truck against the noise and shock. The lower annulus 220 absorbs the rebound.

It will be noticed that the rubber annuli each have a flat metal ring 225 embedded in the rubber, the ring serving to materially stiffen the annulus and assist in preserving its shape. The grooves 226 permit the rubber to expand laterally with greater effect.

Side bearing

The bolsters 61 and 62 are each equipped at their ends with side bearings, generally designated 230, which cooperate with the bolsters to limit side sway of the car body with respect to the car trucks.

The side bearings comprise a bracket 231, which is securely welded to the body frame at 400 and 401. The bracket is triangularly shaped in side elevation (Fig. 6) and includes a bottom wall 402, reinforced by side gussets 403 and an intermediate gusset 404. Midway between the intermediate gusset 404 and the adjacent side gussets are bosses 405, which project upwardly from the bottom wall 402 and are drilled at 406 to receive studs 407, which hold the upper part of the side bearing assembly together.

The portion of the side bearing assembly which is carried by the car body includes, in addition to the side bearing bracket 231, a pair of self-lubricating disks 232, a pair of rubber annuli 408, aluminum plates 409, which are interposed between the self-lubricating disks and the rubber annuli in order to prevent deterioration of the rubber by the oil in the disks, and a sheet metal cap 410, which fits over the rubber annuli and protects them from the deleterious effect of the weather.

The separators 409 are preferably riveted to the disks 232 with aluminum rivets 411, as shown most clearly in Fig. 5. Both are provided with upstanding protuberances 412, which form a shoulder on which the shank 413 of the stud 407 is adapted to seat, and thus limit the depth to which the stud can be screwed into the disk 232. It is, of course, understood that the disks 232 are drilled and tapped to receive the studs.

The ends of the bolster are each equipped with a chrome-finished steel friction plate 233, secured to the bolster by countersunk screws 414, and properly spaced from the bolster by shims 306. The friction plate is preferably arcuate in form, so that the upper side bearing assembly will follow its contour when the truck rotates with respect to the car body.

The adjustment of the center bearing (Figs. 2 and 4) is such that the body weight is normally carried by the center bearing above. However, as the car body sways from one side to the other the side bearings are brought into operation to limit the angle of car inclination. The stud heads 415 being somewhat above the tops of the bosses 405, the disks 232 are always in contact with the plates 233, regardless of whether or not they are supporting a load.

The self-lubricating disks, 232 are preferably made of a tough, wear and pressure resistant, porous material containing about 20% oil, and known to the trade as "Oilite."

The entire side bearing assembly may be quickly removed for repair or replacement, although its simple construction and its ability to keep itself lubricated makes removal seldom necessary.

I claim as my invention:

1. A side bearing for limiting vertical movement between a car body and a car truck, said bearing comprising a smooth surfaced wear plate, a self-lubricating plate adapted to slidably engage the wear plate when the body tilts toward the truck, one of said plates being mounted on the car body and the other on the car truck, a rubber backing for the self-lubricating plate, and

a metal separator between the backing and the said plate.

2. A side bearing for limiting vertical movement between a car body and a car truck, said bearing comprising a smooth surfaced wear plate, a self-lubricating plate adapted to slidably engage the wear plate when the body tilts toward the truck, one of said plates being mounted on the car body and the other on the car truck, a rubber backing for the self-lubricating plate, and a non-porous metal separator between the backing and the said plate.

3. A side bearing for limiting vertical movement between a car body and a car truck, said bearing comprising a smooth surfaced wear plate secured to the car truck, a self-lubricating plate on the underside of the body adapted to slidably engage the wear plate when the body tilts toward the truck, a rubber backing for the self-lubricating plate, and a cap over the backing to protect the rubber from the elements.

4. A side bearing for limiting vertical movement between a car body and a car truck, said bearing comprising a smooth surfaced wear plate secured to the car truck, a self-lubricating plate on the underside of the body adapted to slidably engage the wear plate when the body tilts toward the truck, a rubber backing for the self-lubricating plate, a cap over the backing to protect the rubber from the elements, and a non-porous separator between the self-lubricating plate and the rubber.

5. A side bearing for limiting vertical movement between a car body and a car truck, said bearing comprising a smooth surfaced wear plate secured to the end of the truck bolster, a pair of self-lubricating plates on the underside of the car body adapted to slidably engage the wear plate when the body tilts toward the truck, and rubber annuli interposed between the car body and the self-lubricating plates.

6. In a railway car, a truck bolster, a car body frame supported on said bolster, an extension projecting laterally from each side of said body frame, arcuate bearing plates on the ends of said bolster, a plurality of self-lubricating bearing plates slidably engaging each of said arcuate bearing plates, and resilient members of vibration-deadening material between said self-lubricating bearing plates and said extensions.

7. In a railway car having a bolster and a car body, a pair of side bearings between said body and bolster, each bearing comprising a lower bearing plate, means for rigidly connecting the same to said bolster, a plurality of upper bearing plates, an upwardly extending pin secured to each of said upper bearing plates, means rigidly connected to said body through which said pin slidably extends, and a rubber element surrounding each pin.

8. In a railway car, a car body, a support for said body, side bearings between said body and support each bearing comprising a lower bearing plate secured to said support, an upper bearing plate engaging said lower bearing, a pin extending upwardly from said upper bearing and slidably engaging said body, and a rubber annulus between said bearing plates at each side of said body.

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