United States Patent

Lich

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[54] RESILIENT RAILWAY VEHICLE SUSPENSION

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[73] Assignee: **General Steel Industries, Inc.,** St. Louis, Mo.

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[21] Appl. No.: **851,672**

[52] **U.S. Cl.**.....**105/199 F,** 105/199 C, 105/199 CB, 105/224.1, 105/453, 267/3

[51] **Int. Cl.**.....**B61f 3/08,** B61f 5/14, B61f 5/20

[58] **Field of Search**.....105/196, 197, 199, 453, 199 R, 105/199 C, 199 CB, 199 F, 224.1, 453; 267/3

[56] **References Cited**

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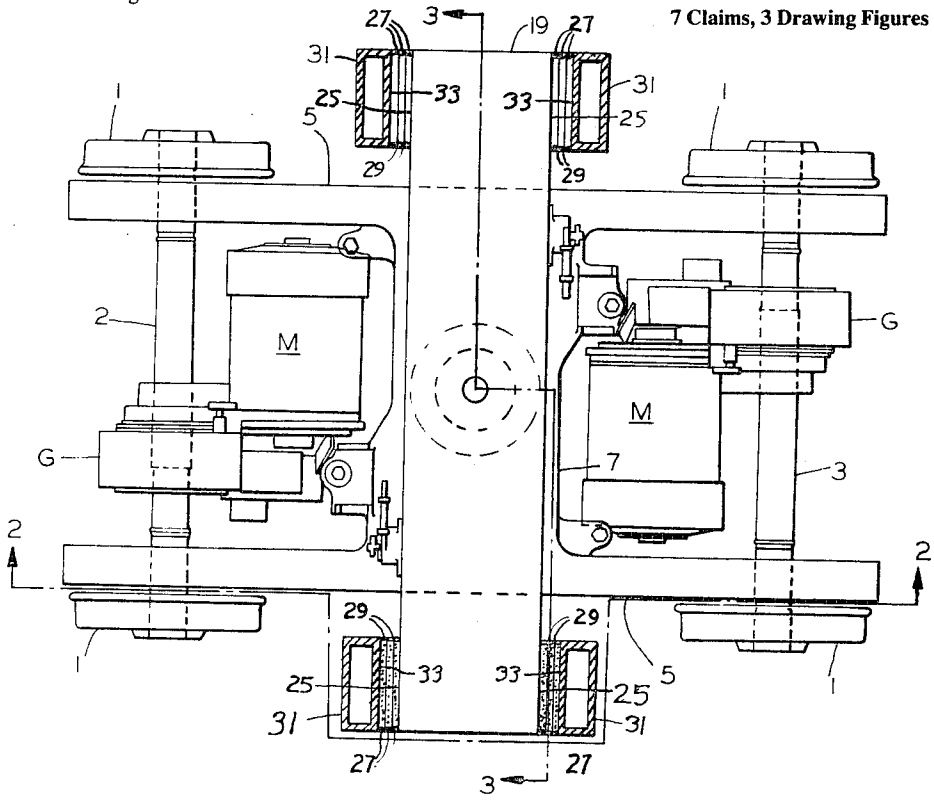
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Primary Examiner—Arthur L. La Point
Assistant Examiner—Howard Beltran
Attorney—Bedell and Burgess

[57] **ABSTRACT**

A railway vehicle suspension including a truck of the type having a transverse load supporting bolster swivelly supported on the truck framing and resiliently supporting the vehicle underframe for relative vertical and lateral cushioning movements only is constructed and arranged so that tractive forces are transmitted from the truck to the underframe at a desirable level below the bolster and at points laterally outboard of the truck frame without locating draft-transmitting devices in these regions where it would interfere with apparatus such as third rail current collection means. The vertical and lateral cushioning means and the draft-transmitting means comprise pairs of opposing transverse surfaces on the bolster and underframe at both sides of the truck inwardly and upwardly steeply inclined longitudinally of the truck, with similarly inclined flat elastomeric pad devices interposed between them, the normals of the surfaces and pads converging at a level below the bolster so that the lines of action of the resultants of the vertical and longitudinal forces, applied to the bolster through the pad devices, converge at a still lower level to provide the desirable low level effective traction transmission point. Vertical and lateral cushioning movements of the underframe on the truck are accommodated and yieldingly resisted respectively by the resilience in shear and compression, and transverse shear of the elastomeric pads and longitudinal tractive and retardation forces are transmitted from the truck to the underframe principally by the resistance of the pad devices to compression by forces acting longitudinally of the truck.

7 Claims, 3 Drawing Figures



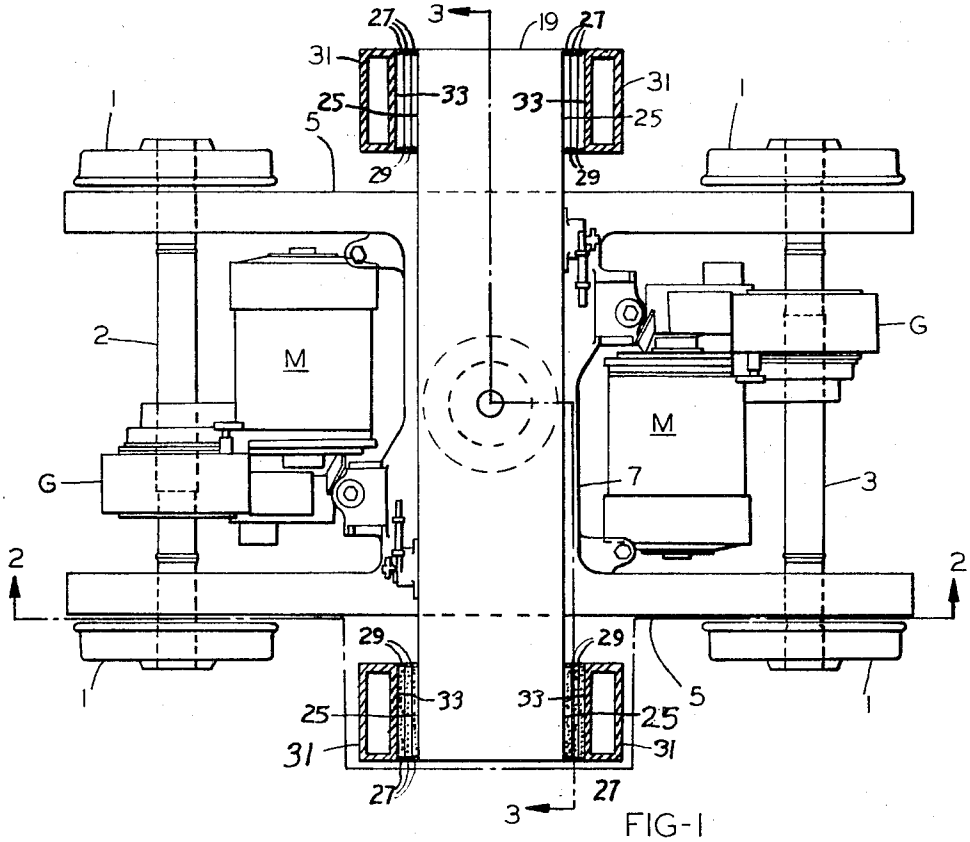


FIG-1

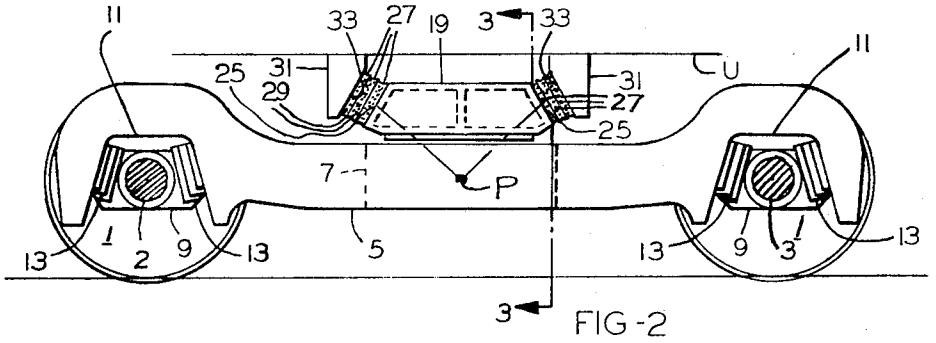


FIG-2

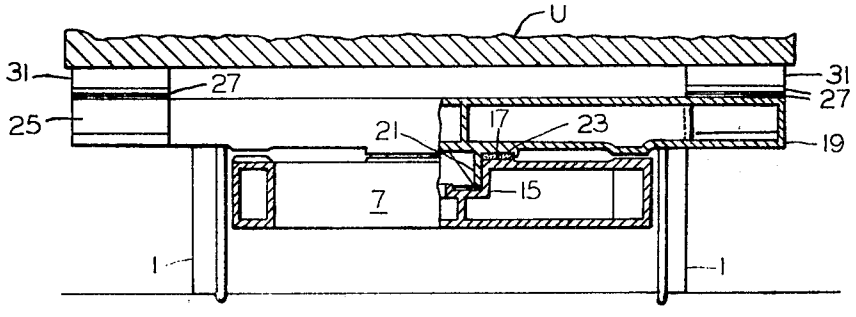


FIG-3

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RESILIENT RAILWAY VEHICLE SUSPENSION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to railway rolling stock and consists particularly in an improved combination draft-transmitting means and resilient suspension.

2. The Prior Art

In railway trucks of the type in which a transverse bolster is swivelly supported directly on the truck framing and resiliently supports the vehicle body by springs carried on the end portions of the bolster adjacent the sides of the body, longitudinal forces are usually transmitted from the truck to the body by longitudinally extending anchor links pivotally connected at their ends to brackets depending from the bolster ends and from the body. The anchor links must be positioned transversely outwardly of the truck framing because of spatial limitations inside the framing, particularly in the case of motor trucks. For maximum effectiveness in preventing excessive weight transference from axle to axle resulting from the vertical moment of longitudinal forces, the anchor links must be at the lowest possible level above the rail. Frequently, a desirably low-level location of the anchor links is made impossible by the necessity of locating other equipment, e.g., third rail collector equipment, at the same level.

SUMMARY OF THE INVENTION

The invention provides unitary means, in a truck of the type in which a transverse bolster is swivelly supported on the truck framing and resiliently supports the vehicle body, for transmitting tractive forces from the truck to the body at a low level, and resiliently supporting the body on the bolster for vertical and lateral cushioning movements thereon, while leaving the sides of the truck below the bolster free of tractive force-transmitting means and available for the mounting thereon of third rail collector equipment and the like. The unitary means comprises pairs of spaced opposing transverse surfaces on the ends of the bolster and sides of the underframe, inclined upwardly and inwardly longitudinally of the truck, with flat elastomeric pad devices interposed between the opposing bolster and underframe surfaces at each side. Vertical loads are cushioned and supported by the yieldability in compression and shear of the pads and by their resistance to distortion in compression and shear, while lateral movements of the body with respect to the bolster are accommodated and yieldingly resisted by the yieldability and resistance of the pad devices in shear transversely of the truck. Longitudinal forces (tractive and braking) are transmitted from the truck to the body principally by the resistance of the pad devices to compression by forces acting longitudinally of the truck.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a truck embodying the invention.

FIG. 2 is a side elevational view of the truck illustrated in FIG. 1, partially sectionalized along line 2—2 of FIG. 1.

FIG. 3 is a transverse vertical sectional view along line 3—3 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The numeral 1 refers to railway flanged wheels mounted in transversely spaced gauged pairs on longitudinally spaced transversely extending axles 2 and 3.

Truck framing, preferably in the form of a rigid one-piece frame of cast metal, comprising transversely spaced longitudinally extending side members 5 connected at their midpoints by a transversely extending transom member 7, is supported on the end portions of axles 2 and 3.

For supporting the truck frame on axles 2 and 3, journal boxes 9 rotatably receive the journal portions of the axles, and the end portions of frame side members 5 are formed with downwardly open pedestal jaws 11 in which journal boxes 9 are vertically movably mounted by means of elastomeric spring devices 13.

Electric traction motors M are suspended from transom 7 and axles 2 and 3 in the spaces between the transom and the respective axles and are drivingly connected to the latter by gear boxes G.

For accommodating swivel of the truck on curved track with respect to a supported car body underframe U, transom 7 is provided at its center with a central bearing, comprising a vertical axis recessed cylindrical wall 15 surrounded by an upwardly facing horizontal annular surface 17 on the top of transom 7.

A transverse bolster 19, preferably of cast metal box-section construction, is formed with a depending central cylindrical boss 21 surrounded by a downwardly facing horizontal annular surface 23, boss 21 being pivotally received in recessed wall 15 and annular surface 23 supported on annular surface 21 by a flat annular pad of friction material to dampen oscillation of the truck about the central bearing axis, as disclosed in U.S. Pat. No. 2,655,117 to J. C. Travilla, of which the assignee is the assignee of the present application.

Bolster 19 extends transversely outboard of truck frame side members 5 and, for supporting car body underframe U and transmitting tractive forces thereto, at its ends, outboard side members 5, is formed with transverse surfaces 25 which are inclined inwardly and upwardly longitudinally of the truck, so that their normals intersect at a substantially lower level than the bolster, and flat, similarly inclined elastomeric pad devices or sandwiches comprising a plurality of flat elastomeric pads 27 bounded by and interleaved by flat metal plates 29, the lowermost boundary plates being rigidly mounted on surfaces 25.

Underframe U is formed at each side with a pair of depending support brackets 31 disposed on opposite sides of the bolster and aligned, longitudinally of the truck, with bolster surfaces 25 and sandwiches 27, 29, and the inner transverse surfaces 33 of brackets 31 are longitudinally inwardly and upwardly inclined parallel to bolster surfaces 25 and are spaced apart sufficiently longitudinally to compress sandwiches 27, 29 between them and the opposing bolster surfaces 25.

Because of the inclination of sandwiches 27, 29 and their mounting surfaces 25 on the bolster and 33 on the underframe, vertical forces corresponding to the body load will be resisted and resiliently accommodated by the resistance and yieldability of sandwiches 27, 29 in vertical compression and shear, while longitudinal (tractive and braking) forces will be transmitted from the truck to the body principally by reason of the resistance of the elastomeric pads 27 to compression longitudinally of the truck. Preferably, surfaces 25 and 33 and sandwiches 27, 29 are steeply inclined to substantially more than 45° from the horizontal to minimize longitudinal yieldability of pads 27, while providing a softer vertical suspension resulting from the lower shear rate of the elastomeric material. Since surfaces 25 and 33 and pads 27 are disposed transversely of the truck, lateral movements of the underframe with respect to the truck are accommodated and cushioned by the yieldability of pads 27 in shear transversely of the truck. Preferably the inclination of sandwiches 27, 29 is such that their normals converge at a level lower than the bolster near point P. The effective point of transmission of tractive forces from the truck frame to the underframe is near the convergence of the pad device normals thereby substantially reducing the magnitude of load transference from axle to axle which would occur if the traction point were at a higher level.

With the disclosed arrangement of the pad devices, it will be seen that the region of the truck below the bolster and outboard of side members 5 will be clear of traction transmitting devices, such as bolster anchors as shown in FIG. 2 of my U.S. Pat. No. 2,988,015, thus permitting the mounting in this region of third rail current collection equipment while at the same time providing the highly desirable low level transmission of tractive forces from the truck to the underframe, and consequent reduction in load transference.

The elastomeric sandwiches form the sole support of the underframe on the truck and the sole mans for transmitting lon-

gitudinal (tractive and braking) forces between the tuck and underframe under normal operating conditions.

It will be understood that various details such as the support of the truck framing on the axles, the construction of the truck framing, the support of the bolster on the truck framing, and the precise inclination of the elastomeric pad devices can be varied without departing from the spirit of the invention.

I claim:

1. A railway vehicle body suspension comprising a truck having spaced wheeled axles, framing supported thereon, a transverse load supporting bolster pivotally supported on said framing intermediate the ends of said framing for movements about a vertical axis at the center of said framing, said bolster being formed with spaced transverse surfaces upwardly inclined toward each other so that their normals intersect at a level substantially lower than said bolster, flat elastomeric pad devices seated on said bolster inclined surfaces, and body support elements securable to the body and having similarly inclined downwardly facing transverse surfaces resting on and secured to said pad devices whereby longitudinal forces are transmitted between the truck framing and car body to be effective below the bolster near the level of the convergence of the normals of said pad devices, and lateral and vertical cushioning movements are permitted and yieldingly resisted by deflection of said pad devices and their resistance to deflection respectively in shear and in shear and compression, said pad devices forming the sole support of the body on the truck and the sole means for transmitting longitudinal forces between the body and the truck under normal operating conditions.

2. A railway vehicle body suspension according to claim 1, including two sets of said elastomeric pad devices spaced apart transversely of said truck.

3. A railway vehicle body suspension according to claim 2, including two sets of said body support elements spaced apart correspondingly with said pad devices.

4. A railway vehicle body suspension according to claim 3 wherein said elastomeric pad devices and said body support elements are positioned outboard of said truck framing.

5. A railway vehicle body suspension according to claim 3 wherein said elastomeric pad devices are sandwiches comprising a plurality of flat elastomeric pads and a plurality of metal plates interleaving and bounding said pads.

6. A railway vehicle body suspension according to claim 3 wherein the inclination of said bolster surfaces exceeds 45° from the horizontal.

7. A railway vehicle body suspension according to claim 1 wherein said bolster surfaces are steeply inclined.

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