Nov. 21, 1950 M. P. BLOMBERG 2,530,756

DRAFT GEAR

Filed May 3, 1946 3 Sheets-Sheet 1

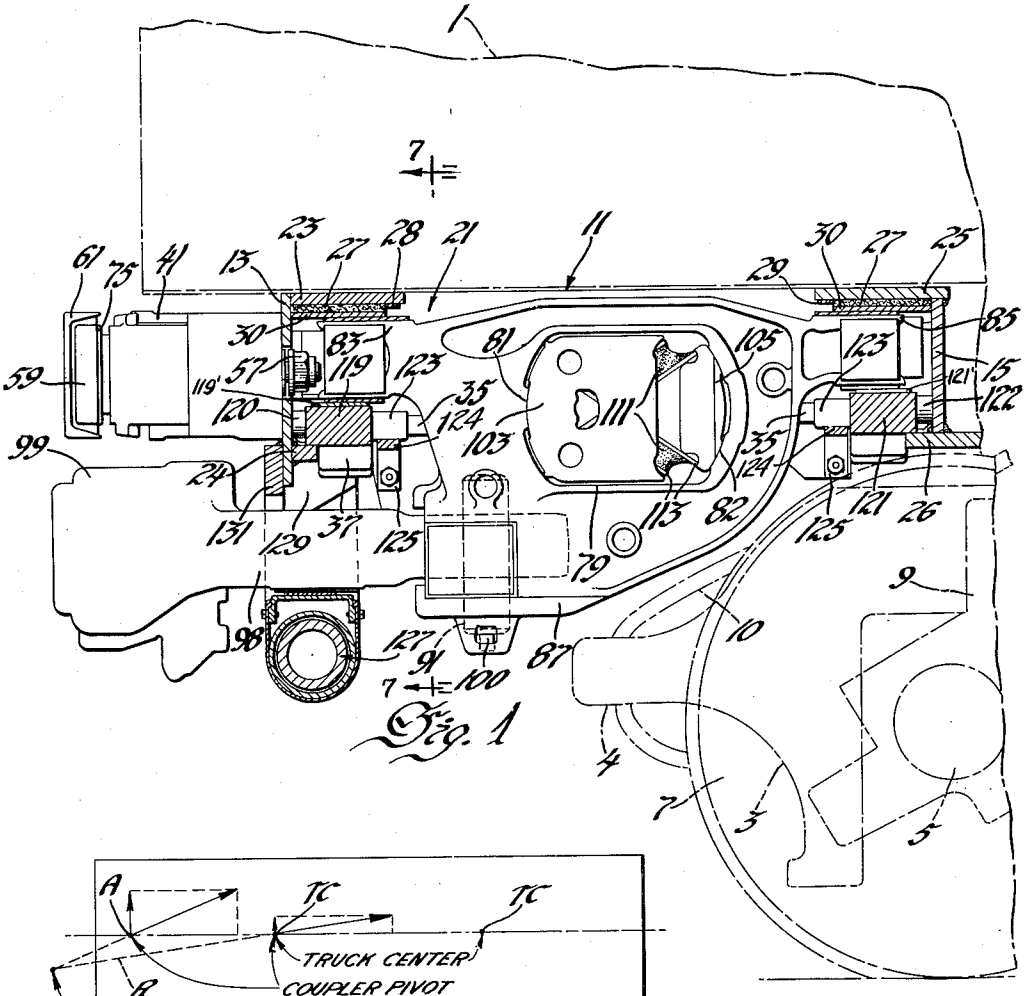


Fig. 1

Fig. 5

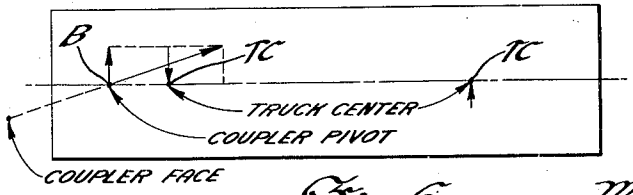


Fig. 6

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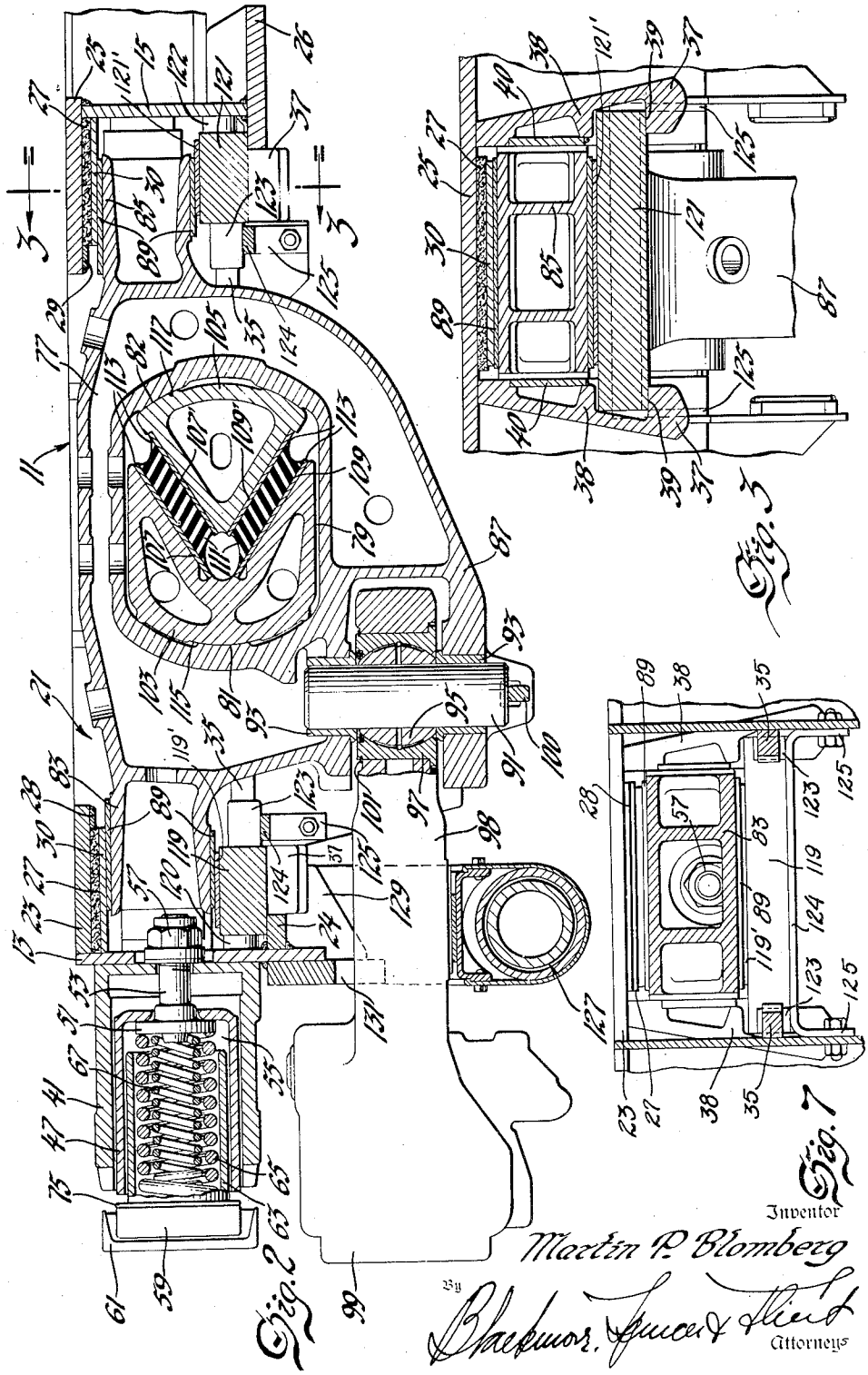


Fig. 2

Fig. 3

Fig. 7

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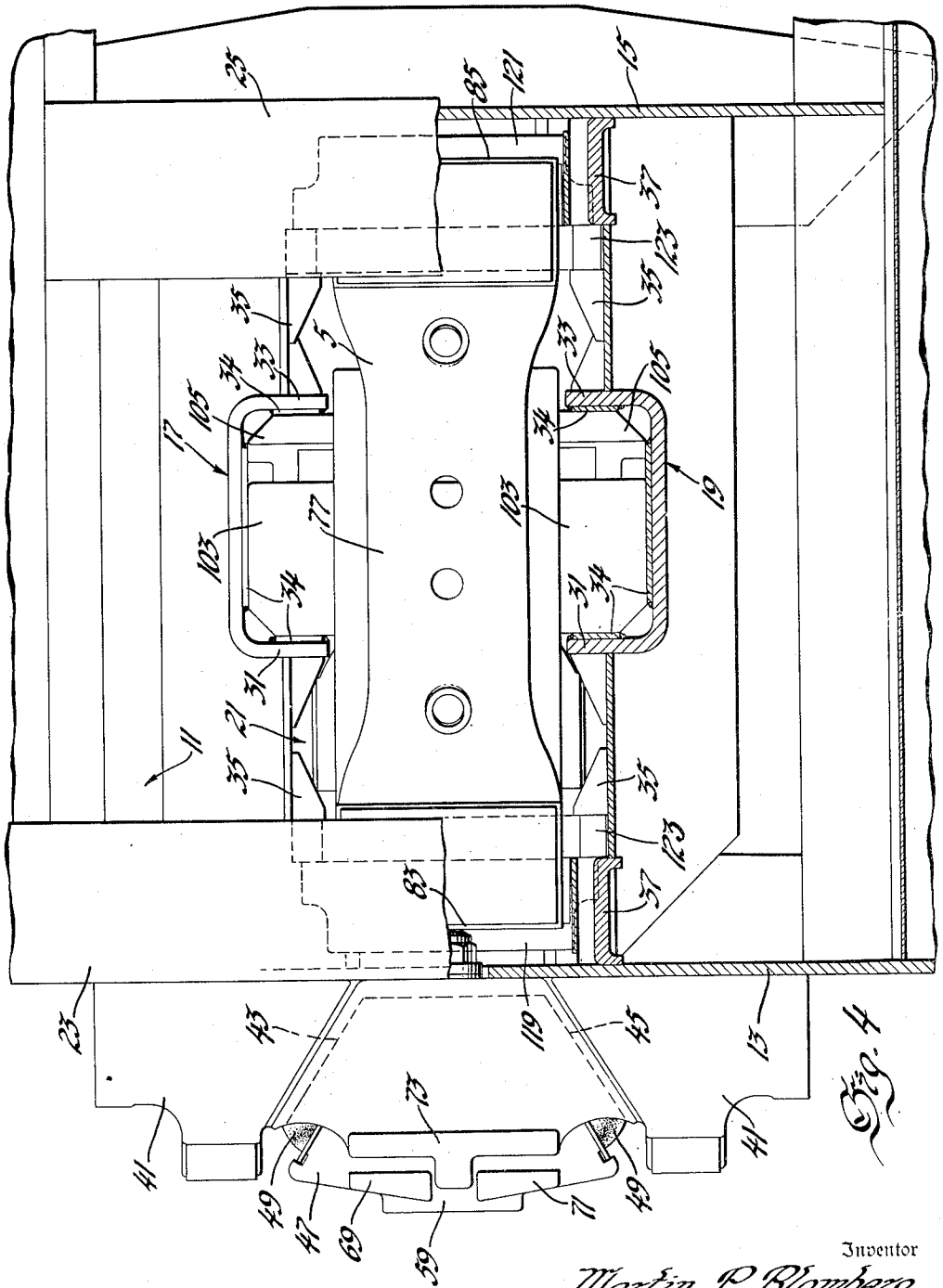


Fig. 4

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UNITED STATES PATENT OFFICE

2,530,756

DRAFT GEAR

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13 Claims. (Cl. 213—67)

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This invention relates to cushioning means for railway vehicle bodies and more particularly to means for cushioning draft and buffing shocks.

Conventional draft gears are of great length and project downwardly from the body and consequently limit the clearance space between the draft gear and truck end sill. On locomotives the traction motors supported on and geared to the truck axles further reduce the space for the draft gear. In order to provide space for draft gears on locomotives the traction trucks are articulated to the body further from the ends resulting in greater overhang of the ends of the body with respect to the trucks. It will be evident that the greater the distance from the truck center to the point of the draft gear to which the coupler is pivoted the greater the lateral component of the buffing and draft forces on the body when rounding turns and passing through crossovers.

The principal object of the invention is to provide a draft gear of short length insertable in a pocket of short length in the body underframe immediately adjacent the ends and providing coupler attaching means on a projection draft gear extending downwardly out of the draft gear pocket so that the coupler is connected to the draft gear as close as possible to the truck center without interfering with the truck end sill, traction motors and electrical leads therefor thereby increasing the truck base and reducing the lateral component of the buffing and draft forces applied by the couplers to the body.

Another object is to provide buffing means acting in combination with the draft gear to cushion buffing shocks, prevent slack between the couplers and further prevent lateral movement of the bodies of coupled vehicles.

The combined means by which these objects are accomplished and the advantages derived thereby will become apparent by reference to the following detailed description and drawings illustrating these means.

Figure 1 of the drawings is a partial side elevation of a railway vehicle with parts broken away to clearly illustrate details of the means for cushioning draft and buffing shocks.

Figure 2 is an enlarged vertical sectional view taken on the longitudinal center plane of one end of the vehicle.

Figure 3 is an enlarged transverse sectional view taken on line 3—3 of Figure 2.

Figure 4 is an enlarged plan view of one end of the vehicle with parts broken away.

Figure 5 is a diagrammatic view illustrating the forces applied to the body with conventional draft gears.

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Figure 6 is a diagrammatic view illustrating how the lateral force applied to the vehicle body is reduced by use of my improved draft gear.

Figure 7 is an enlarged transverse sectional view taken on line 7—7 of Figure 1.

In Figure 1 of the drawings an end portion of the body or cab of a locomotive and one articulated traction truck, including a traction motor, is shown in dash and dot lines. The body or cab is indicated at 1, the truck at 3, the truck end sill at 4, the truck axle at 5, truck wheels at 7 and a traction motor 9 supported on and geared to the axle in conventional manner and having electrical motor leads 10.

The cab or body 1 includes a built-up cab or body underframe generally indicated at 11 comprising an end sill 13, a transverse member 15 longitudinally spaced therefrom and built-up center sill members generally indicated at 17—19, Figure 4, spaced apart transversely and secured between the end sill 13 and member 15 to form a central draft gear pocket, generally indicated at 21 and located immediately adjacent the end sill, as best shown in Figures 1, 2 and 4.

The end sill 13 is provided with inwardly extending upper and lower supporting flanges 23—24 and the transverse member 15 is likewise provided with upper and lower flanges 25—26 extending into the pocket 21. A cushion 27 is shown on the underside of the upper supporting flanges 23—25 adjacent stops 28—29 thereon and a wear plate 30 is shown on the underside of each cushion 27.

The built-up center sills 17—19 are provided with U-shaped central facing portions, the legs 31—33 of which extend into the pocket and serve as draft and buffing stops. Wear plates 34 are secured to the inner vertical faces of the legs or stops 31—33 and bottom of the U-shaped portions. Additional inwardly extending stops 35 are secured to the inner face of the center sill members 17—19 on either side of the U-shaped central portions. The stops 35, as will be subsequently explained, serve as key retainer stops. Flanged members 37 having inwardly extending supporting flanges 38—39 are secured to the inner face of the center sills 17—19 at each end of the draft gear pocket 21, as best shown in Figures 3 and 4. It will be noted that the upper face of the lower supporting flanges 39 of the flanged members 37 are adjacent and flush with the upper faces of the lower supporting flanges 24—26 of the end sill 13 and transverse member 15. Wear plates 40 are secured to the inner face of the flanged members 37 above the flanges 38.

Secured on the outer face of the end sill 13 is

a buffer pocket 41 having outwardly diverging internal side surfaces 43—45, as best shown in Figure 4. A buffer wedge 47 having complementary external diverging side surfaces is movably mounted in the pocket 41. Rubber cushions 49 are located between each of the outwardly diverging internal and external side surfaces of the buffer pocket 41 and wedge 47 and the head 51 of a buffer bolt 53 engages with the bottom of a central pocket 55 in the wedge and the bolt extends through aligned openings in the wedge 47 and body end sill 13. A nut 57 on the inner end of the bolt 53 draws the wedge into the buffer pocket 41 to compress the rubber cushions 49 therebetween and to hold the parts in position when assembled.

A buffer head 59 has a channel chafing plate 61 pivoted thereon in any convenient manner and a hollow plunger portion 63 slidable in the pocket 55 of the wedge 47. Compression springs 65—67 are placed between the outer end of the plunger portion and the head 51 of the buffer bolt 53 and suitable retaining means, not shown, are provided to retain the plunger 63 of the buffer head 59 in the pocket 55 of the wedge 47 and allow inward movement of the buffer head against the compression force exerted by the springs 65—67. As best illustrated in Figure 4, lugs 69—71 are provided on the upper and lower faces of the wedge 47 either side of the longitudinal center line and T-shaped lugs 73 are provided on the upper and lower faces of the buffer pocket 41 with the stem portion of these T-shaped lugs 73 shown extending outwardly between the lugs 69—71 on the wedge 47. With this arrangement of lugs transverse and inward movement of the wedge is limited by contact between the lugs 69—71 and 73. Shims 75 are placed on the plunger portion 63 of the buffer head 59 to limit movement of the plunger into the wedge 47.

A draft gear assembly having short overall length is adapted to be inserted into the draft gear pocket 21 formed in the cab underframe 11 for support therein by the following means. This assembly includes a member or yoke 77 having an elongated opening 79 extending transversely therethrough and provided with internal cylindrical end surfaces 81—82 and yoke end projections 83—85 of rectangular form located slightly above the longitudinal center line of the yoke opening 79 and another projection 87 shown extending downwardly below the bottom of the opening and outwardly of the pocket 21. Wear plates 89 are secured to the upper and lower faces of the yoke end projections 83—85 and coupler attaching means are provided on the downwardly extending projection 87. This coupling attaching means includes a pin 91 supported in vertically spaced bushings 93 in aligned openings in the yoke projection 87 with bushings 95—97 having complementary spherical and cylindrical surfaces located on the intermediate portion of the pin 91 whereby the inner end of the shank 98 of a coupler 99 is mounted for limited universal movement on the yoke 77. The yoke pin 91 is held in place by means of a key 100 and the bushings 95—97 are held in the end of the coupler shank 98 by a snap ring 101. The coupler 99 may be disconnected from the yoke by removal of the key 100 and pin 91.

Within the yoke opening 79 and extending therethrough are yoke followers comprising a draft gear wedge pocket 103 and a wedge member 105 having complementary inclined inner surfaces 107—109—107'—109' between which are

rubber cushions 111 having plates 113 bonded to opposite faces and in contact with these complementary inclined surfaces. The cushions 111 urge the wedge pocket 103 and wedge 105 apart so that the respective central outer cylindrical surfaces 115—117 provided thereon are held in contact with the respective cylindrical end surfaces 81—82 of the yoke opening 79. The outwardly projecting end portions of the wedge pocket and wedge 103—105 have vertical outer face and end surfaces.

The shorter lower flanges 24—26 of the draft gear pocket 21 in the cab underframe permits the above draft gear assembly to be upwardly inserted therein. When the draft gear assembly is inserted in the pocket, as best shown in Figures 2 and 4, the upper wear plates 89 on each yoke end projections 83—85 are in contact with a plate 30 on a cushion 27, which cushions, as explained, are on the lower faces of the upper flanges 23—25 of the end sill 13 and transverse member 15. In order to hold the assembly in the pocket 21 and permit longitudinal movement of the yoke 77 in the pocket, keys 119—121 having wear plates 119'—121' on the upper face are inserted above the lower flanges 39 of the members 37 to a position below the lower wear plates 89 on each yoke end projection. The key 119 then rests on the lower flanges 39 of the outer flange members 37 and the lower flange 24 of the end sill 13 and in contact with a stop 120 of the end sill. The key 121 rests on the lower flanges 39 of the inner flanged members 37 and lower flange 26 of the transverse member 15 and is in contact with a stop 122 on the member 15. A key retainer 123 is inserted between the back face of the key 119 and the front faces of the adjacent key stops 35 on the center sills 17—19. The key retainer 123, as best illustrated in Figures 1, 2 and 7, is secured in any convenient manner, preferably by welding, to the upper face of an inverted U-shaped member 124 and the legs 125 of the member 124 are bolted to the center sills. Another key retainer 123 secured to another U-shaped member 124 is inserted between the front face of the key 121 and the adjacent back faces of other key stops 35 on the transverse member 15 and the legs 125 of this member 124 are also bolted to the center sills 17—19, as best shown in Figures 1, 2 and 3. The yoke end projections 83—85 are then free to move longitudinally in either direction on the keys 119—121 without moving the keys longitudinally. It will be evident that if it is desired to insert the draft gear assembly downwardly into the pocket the relative positions of the upper flanges 23—25 and lower flanges 24—26 must be reversed and the keys 119—121, key retainers 123, and stops 35 must be located adjacent the top of the pocket.

Resilient coupler supporting and centering means, generally indicated at 127, of the same type shown in my United States Patent 2,380,018, filed April 17, 1944, is supported by a member 129 having an upper coupler stop 131 and connected at the top to the end sill 13. The shank 98 of the coupler 99 is inserted between the coupler supporting and centering means 127 and coupler stop 131 of the member 129 and the coupler shank 98 is connected to the lower yoke extension 87 in the manner previously described for limited universal movement with respect thereto.

With the above described short length draft gear assembly and buffing means mounted on the cab underframe 11 immediately adjacent the end, articulated supporting and traction trucks

may be articulated to the body or cab underframe closer to the ends and thereby reduce the overhang of the ends of the body cab and also to increase the truck base as more clearance is provided for the truck end sill 4, traction motor 9 and traction motor leads 10 at the outer end of the truck 3, as best shown in Figure 1.

When the underframe 11 and coupler 99 are in longitudinal alignment and draft force is transmitted between the underframe and coupler the yoke 77 is pulled outwardly in the pocket and torque is applied thereto in a clockwise direction as the coupler is attached to the projection 87 of the yoke 77 below the projections 83 and 85 by which it is supported in the pocket 21. These forces on the yoke are cushioned by outward movement of the draft gear wedge 105 with respect to the wedge pocket 103, which is prevented from outward movement by the outer legs or stops 31 on the center sills 17—19 to cause compression of the rubber cushions 111 between the wedge pocket and wedge 103—105. The clockwise torque force on the movement of the yoke is permitted by the engaging cylindrical surfaces 81—82—115—117 of the yoke and draft gear wedge pocket and wedge and this force is cushioned by compression of the cushion 27 between the yoke outer end projection 83 and the upper flange 23 of the end sill 13. The yoke inner end projection 85 is then maintained in contact with the key 121 supported by the underframe to resist the torque force. This slight upward movement of the outer end of the yoke by compression of the cushion 27 relative to the coupler is permitted by the bushings 95—97 having spherical surfaces by which the coupler 99 is connected to the yoke 77.

With the underframe and coupler in longitudinal alignment and buffing force transmitted therebetween, the yoke is pushed inwardly and torque force in a counterclockwise direction is applied thereto. These forces cause the wedge pocket 103 to move inwardly and compress the cushions 111 between it and the wedge member 105 which is then in contact with the inner legs or stops 33 on the center sills 17 and 19 and the cushion 27 between the inner yoke projection 85 and upper flange 25 of the transverse member 15 is compressed to cushion this torque force. The outer yoke projection 83 is accordingly held in contact with the outer key 119 supported on the underframe to resist this torque force.

When vehicles having buffing and draft gears of the type described are coupled the buffing channel chafing plates 61 are maintained in contact by compression of the buffer springs 65—67 and cushions 49 to retain the pulling faces of coupled couplers in contact for all relative positions of the bodies or cabs and couplers thereon. The buffers accordingly act in combination with the draft gears to cushion buffing and coupling shocks which are of greater intensity than draft shocks and also damp out relative movement between the cabs of coupled vehicles.

When the coupled vehicles are rounding curves or passing through track crossovers the bodies and couplers are angularly related thereto and the draft and buffing forces therebetween will accordingly cause a lateral component of these forces to be applied to the cab underframe at the points of attachment of the couplers.

As mentioned, in conventional draft gears of long length the truck centers must be located inwardly from the ends of the body in order that there will be no interference between the draft

gear and truck and traction motor thereon. As best shown in Figure 5 the lateral component of the draft and buffing forces is applied at the truck center TC with a radial type draft gear indicated at R in which the member including the draft gear and coupler is pivoted to the body at the truck center TC. When the draft gear is supported on the body and the coupler is pivoted thereto at a point A between the truck center TC and end of the body the lateral component of the draft and buffing force increases with distance between points TC and A and this lateral component tends to cause the body to rotate in a horizontal plane relative to the truck centers TC, which centers become the reaction points.

With my improved shorter length draft gear, as best shown in Figure 6, the distance between the point of coupler attachment B and truck center TC may be reduced and the truck base increases thus decreasing the lateral component of the draft and buffing force and increasing the distance between the truck centers TC or reaction points to thereby reduce rotation of the body relative to the truck centers and still provide sufficient clearance between the draft gear and truck and traction motor thereon. As previously mentioned the frictional force between the buffers of adjacent coupled vehicles also damps out relative rotation and cocking of the bodies relative to their respective trucks.

I claim:

1. A railway draft gear yoke having projecting end support portions and a side projecting portion including coupler attaching means, said yoke having an opening extending transversely with respect to said end and side projecting portions and through the yoke intermediate the end support portions thereof.

2. A railway draft gear yoke having oppositely projecting end support portions and an opening for receiving cushioning means extending transversely therethrough intermediate said support portions, said yoke having coupler attaching means offset laterally from a line connecting the said end support portions.

3. A railway draft gear comprising a yoke having an opening therethrough, cushioning means in the yoke opening, said yoke having projecting support portions at opposite ends, a projection extending downwardly therefrom intermediate the support portions and coupler attaching means on said projection.

4. In a railway vehicle, a body comprising an underframe having an end sill and members forming a pocket having internal projections at the ends and located immediately adjacent said end sill, a draft yoke insertable and movable between said internal pocket projections and having a portion projecting downwardly below said underframe, coupler attaching means on said draft yoke portion, a coupler connected to said attaching means and extending longitudinally outward below said end sill and means carried by said end sill for supporting said coupler.

5. A railway vehicle comprising a body including an underframe, said body underframe including members arranged to form a pocket having internal flanges, said pocket being located immediately adjacent one end of said underframe, a draft yoke supported at longitudinally spaced points by said flanges of said pocket, said yoke having a portion projecting downwardly below said pocket, coupling attaching means located on said yoke portion, a coupler connected to said attaching means and extending horizon-

tally outward of the end of said underframe and coupler supporting means attached to the end of said underframe.

6. Cushioning means for a vehicle having a body underframe provided with a central pocket immediately adjacent the end, said pocket having vertically spaced flanges and longitudinally spaced stops, a member movably supported at its ends between said flanges, said member having a transverse elongated opening therethrough between the ends thereof and a projection extending downwardly from said member and out of said pocket coupler attaching means on said projection, separate followers extending through the ends of said opening in said member and positioned between said stops and cushion means between said followers.

7. Cushioning means for a railway vehicle comprising an underframe having a central pocket immediately adjacent the end thereof, said pocket having upper and lower end flanges and longitudinally spaced stops, a yoke having end portions insertable between said end flanges, a cushion between each yoke end portion and a pocket upper flange, keys insertable between said pocket lower flanges and said yoke ends to retain said yoke in said pocket, said yoke having a downwardly directed extension, a coupler pivoted on said yoke extension, means on said underframe movably supporting said coupler and a shock absorbing cushion and yoke follower means on either end thereof extending through the yoke opening, said follower means being positioned between said longitudinally spaced pocket stops.

8. Cushioning means for a railway vehicle comprising an underframe having a central pocket intermediately adjacent the end, said pocket having upper and lower end flanges and longitudinally spaced side stops, cushions secured to said upper end flanges, a cushion assembly comprising a movable member insertable upwardly in said pocket so that the ends thereof are cushioned by said cushions on said upper end flanges and movable with respect to said flanges, said member having an opening extending transversely therethrough, and a portion extending downwardly below and toward the outer end of said pocket, said portion being provided with coupler attaching means, followers extending through the opening in said member and into the space between said pocket side stops, a deformable cushion between said followers normally urging said followers into contact with the ends of the opening in said member, keys between the ends of said member and said lower pocket flanges for retaining and supporting said member in said pocket and key retainers secured to the pocket sides between said keys and pocket side stop members.

9. In a vehicle, an underframe provided with a pocket in the center immediately adjacent the end, said pocket having upper and lower flanges and longitudinally spaced stop members, means for cushioning draft and buffing shocks in said pocket comprising cushions on the underside of said upper pocket flanges, a yoke having end portions insertable between said upper and lower flanges and a portion extending downwardly out of said pocket, a key between each of said lower flanges and said yoke end portions for supporting and retaining said yoke in said pocket, yoke followers in the opening of said yoke positioned between said stop members, a deformable cushion between said followers, a coupler mounted for universal movement on said downwardly extending portion of said yoke and coupler supporting means secured to the end of said underframe.

10. In a vehicle, a body underframe having a central pocket immediately adjacent the end, said pocket having vertically spaced end flanges and longitudinally spaced stops, means for cushioning draft and buffing shocks applied to said underframe comprising a yoke having end projections insertable between said pocket end flanges and having a downwardly extending portion provided with coupler attaching means, cushions between said yoke end projections and upper pocket end flanges, keys insertable between said lower pocket end flanges and the end projections of said yoke for supporting and retaining said yoke in said pocket, key retainers secured in said pocket, yoke followers and deformable cushions therebetween located in said yoke opening, said followers projecting into the space between said stop members, said deformable cushions urging said followers into contact with the end portions of the yoke opening and said stops.

11. In a vehicle, a body underframe having a central pocket immediately adjacent the end, said pocket having vertically spaced end flanges and longitudinally spaced stops, means for cushioning draft and buffing shocks on said underframe, said means comprising a yoke upwardly insertable into said pocket between the end flanges, cushioning means between said upper pocket end flanges and said yoke, keys insertable between said lower end flanges and yoke for supporting and retaining said yoke in said pocket, said yoke having a portion extending downwardly out of said pocket, a coupler mounted for universal movement on said downwardly extending yoke portion, cylindrical surfaces at the ends of said yoke opening, yoke followers extending through said yoke opening, each of said followers having a cylindrical portion cooperating with one of said cylindrical end surfaces of said yoke opening, the ends of said followers being upwardly insertable between said stops, deformable cushion means between said followers normally urging said cylindrical surfaces thereon into contact with corresponding surfaces of said yoke and coupler supporting means secured to said underframe.

12. Cushioning means for a vehicle comprising a body underframe, said underframe having a central pocket immediately adjacent the end, said pocket having side recesses and flanges in opposite ends, means for cushioning draft and buffing shocks insertable in said pocket, said cushioning means comprising a yoke movably mounted between the end flanges of said pocket and having a downwardly projecting portion provided with coupler attaching means, deformable cushions and yoke followers on opposite ends of said cushions located in the opening of said yoke, the outer ends of said followers extending into the side recesses of said pocket, said deformable cushions normally holding said followers in contact with the end surfaces of the yoke opening, said follower and yoke surfaces in contact being cylindrical, a coupler mounted for universal movement on said coupler attaching means, and means on said underframe for supporting said coupler.

13. Cushioning means for a vehicle comprising a body underframe having a central pocket immediately adjacent the end, said pocket having longitudinally spaced stops and vertically spaced end flanges, cushions on certain of said flanges, shock absorbing cushions and follower means on opposite ends of said shock absorbing cushions located in said pocket between said stops, a mem-

ber surrounding said follower means and said shock absorbing cushions to compress and deform said shock absorbing cushions, said member being movably cushioned between said pocket end flanges by said cushions on certain of these flanges and cooperating with said followers to cushion movement of said member by action of said shock absorbing cushions, said member having a projection extending outwardly of said pocket, a coupler connected to said projection and coupler supporting means carried by said underframe.

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