United States Patent

[11] 3,565,265

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[73] Assignee Lord Corporation
Erie, Pa.

[54] RAILWAY CAR
5 Claims, 18 Drawing Figs.

[52] U.S. Cl. 213/8
[51] Int. Cl. B61g 9/12
[50] Field of Search 213/8.43

[56] References Cited

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3,217,897	11/1965	Peterson	213/43
3,390,787	7/1968	Grumblatt	213/8
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Primary Examiner—Drayton E. Hoffman
Attorney—Ralph Hammar

ABSTRACT: An end of car draft and cushion unit having a coupler connected to the sill through draft gear alone for draft forces and through draft gear in series with shear mountings for buff forces. The shear mountings are preloaded between stops on the sill to resist buff forces.

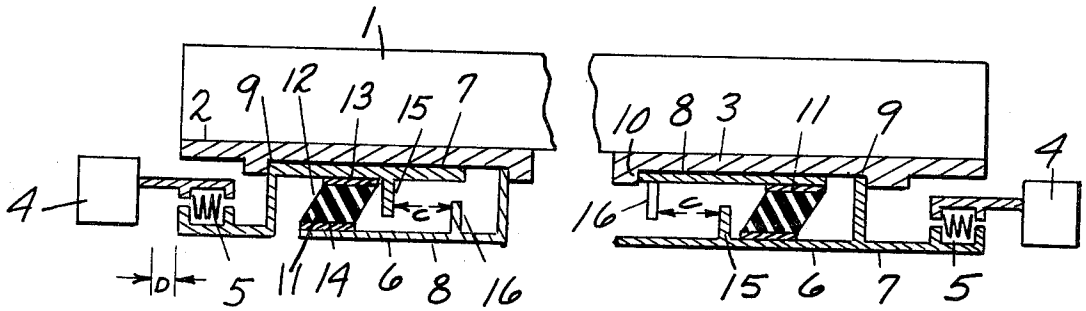


FIG. 1

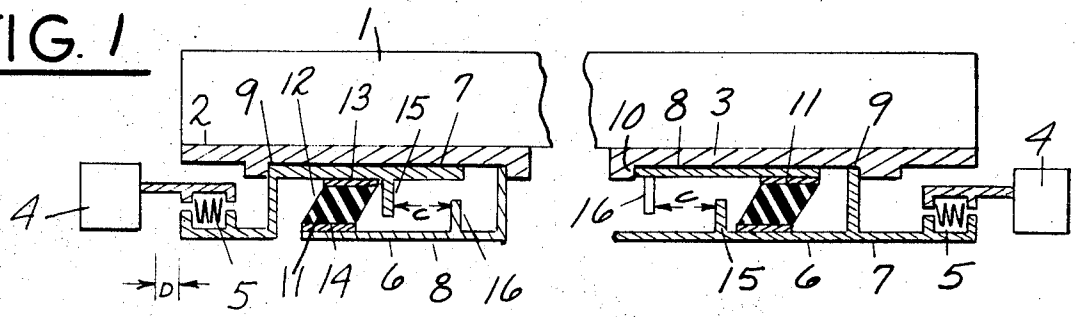


FIG. 2

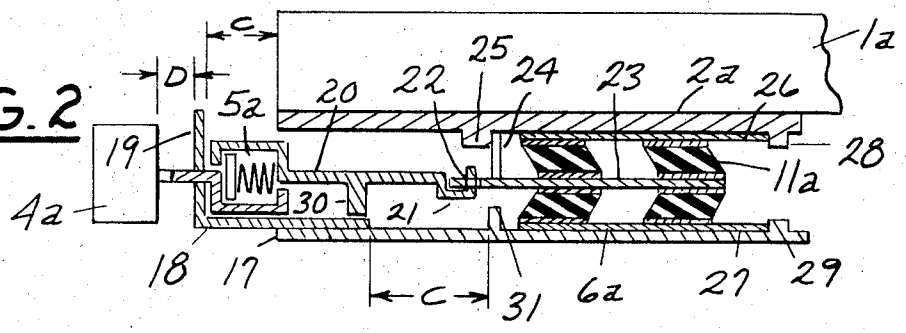


FIG. 3

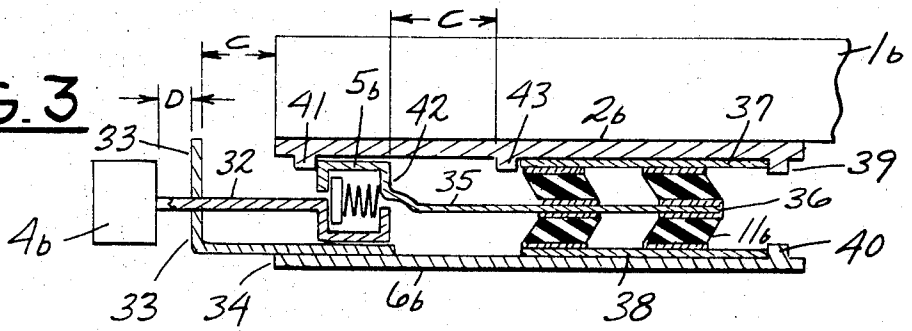
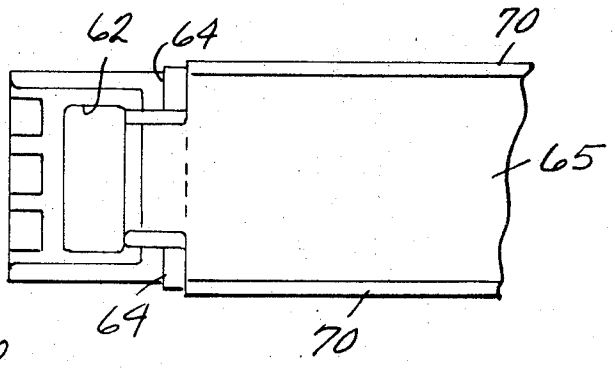


FIG. 13



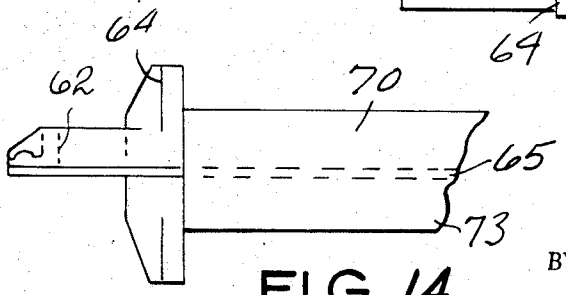


FIG. 14

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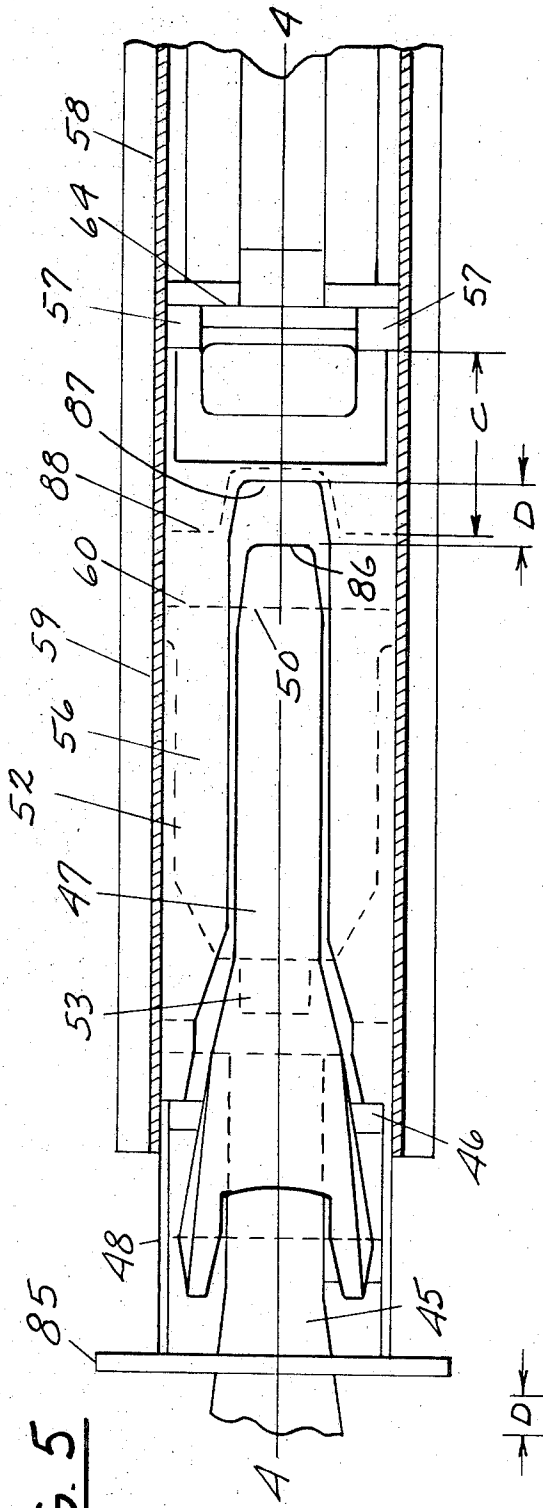


FIG. 5

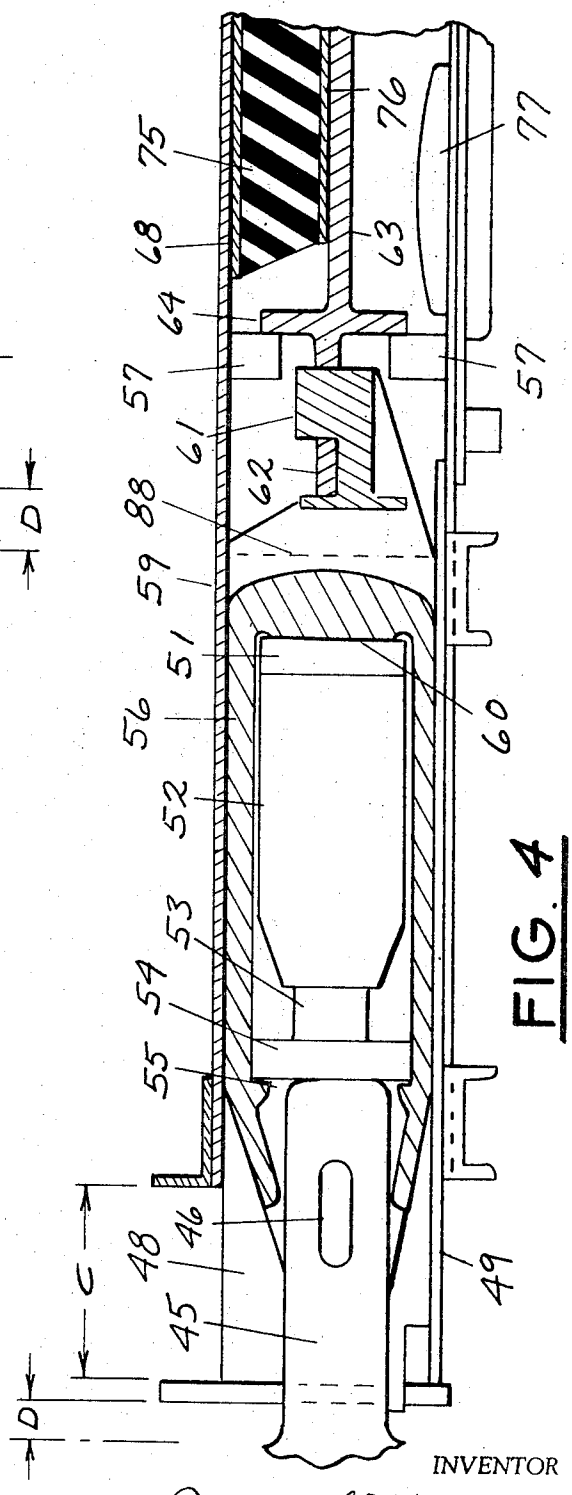


FIG. 4

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FIG. 6

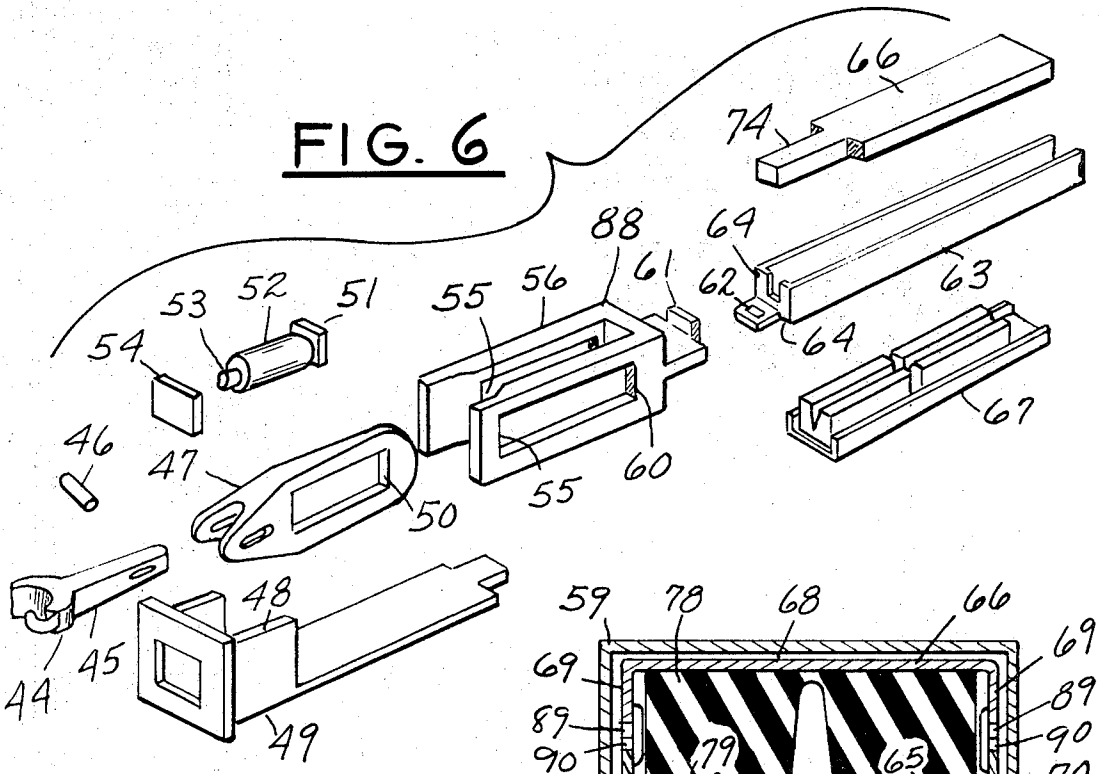


FIG. 9

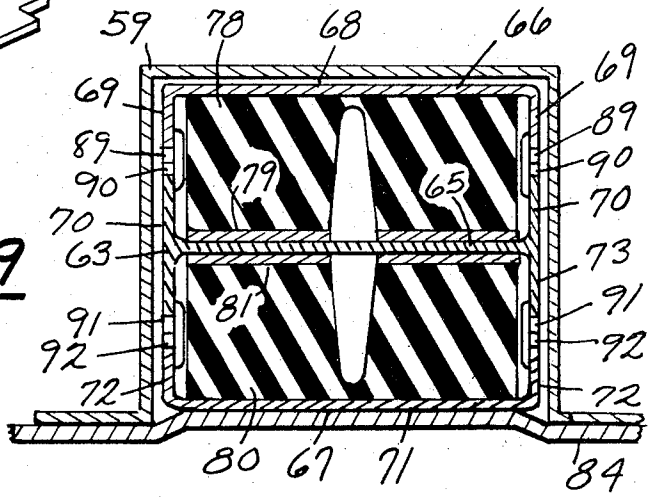
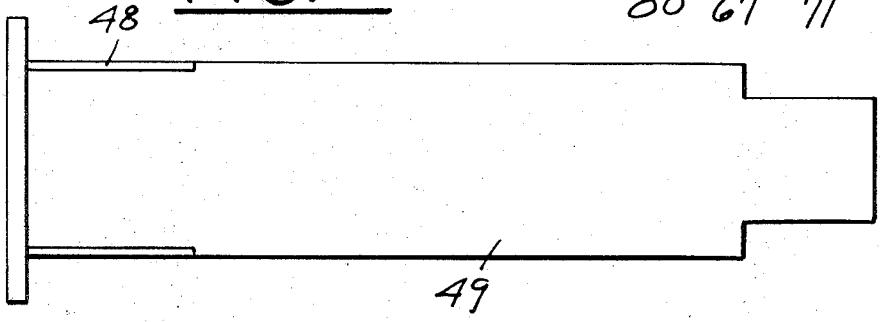


FIG. 15



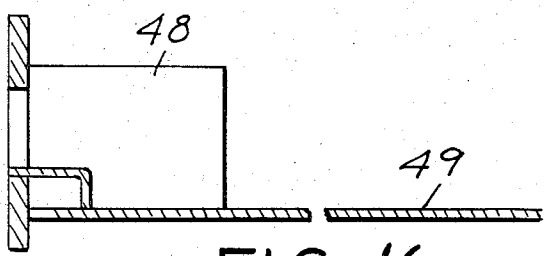


FIG. 16

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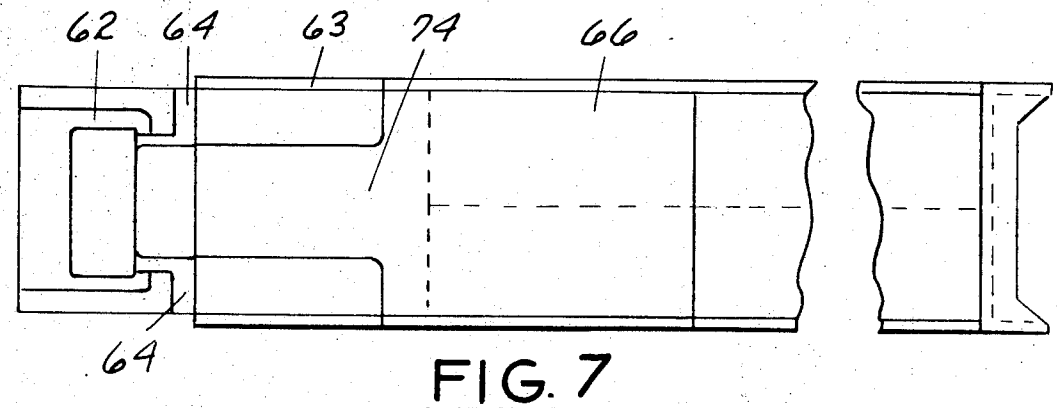
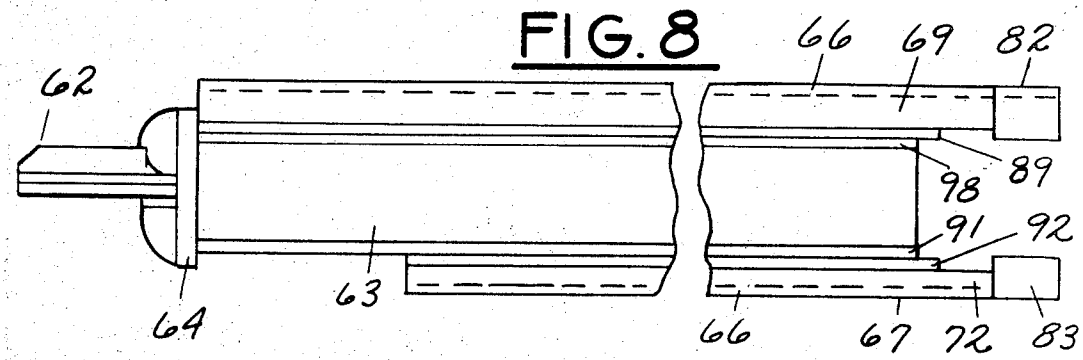


FIG. 7

FIG. 8



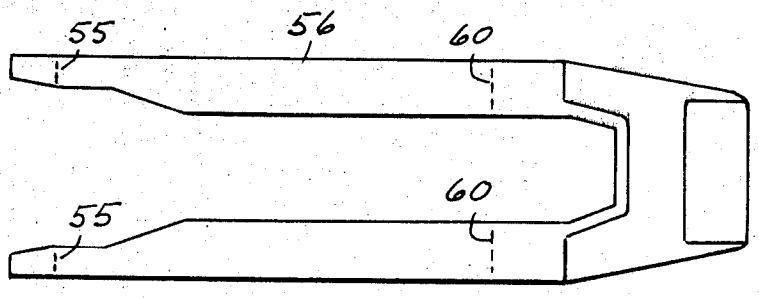


FIG. 10

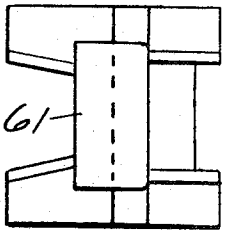


FIG. 12

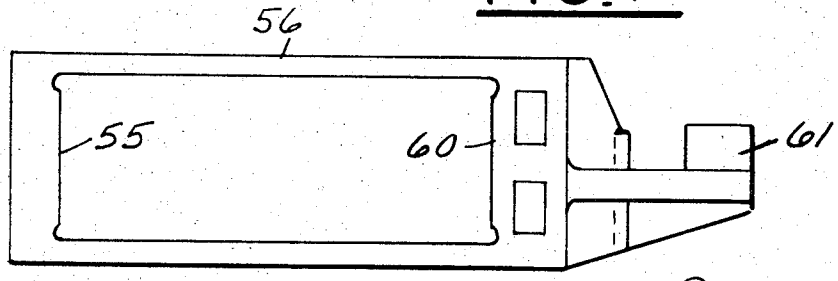


FIG. 11

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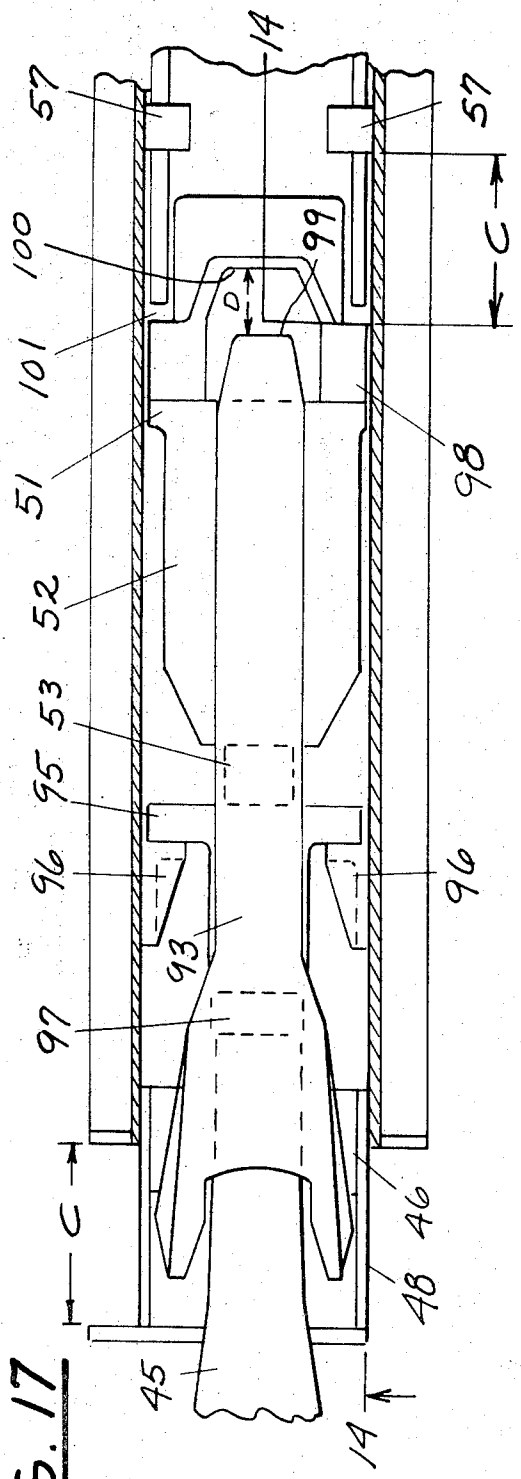


FIG. 17

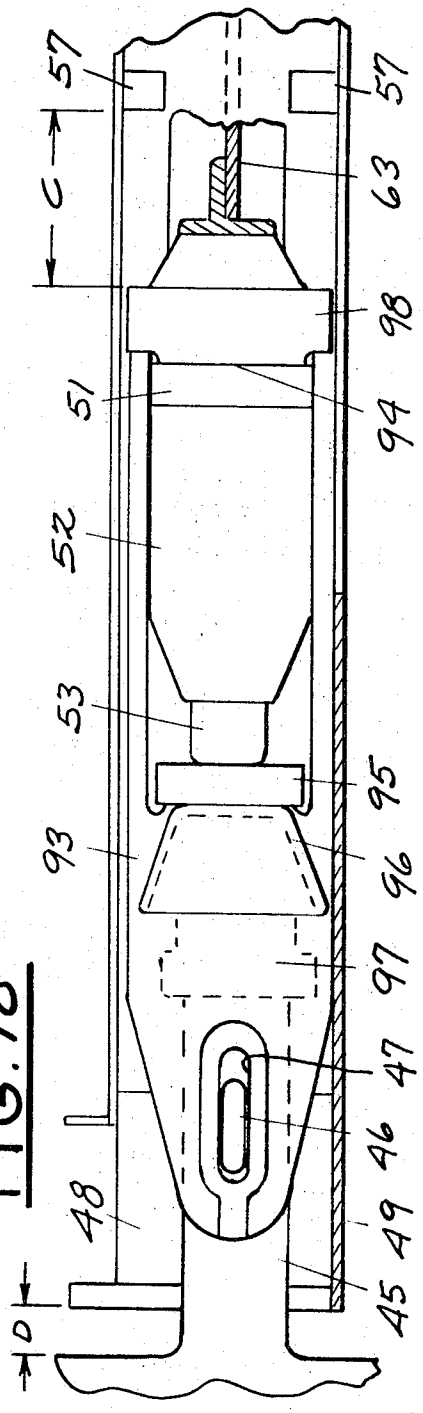


FIG. 18

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RAILWAY CAR

This invention improves Patent No. 3,390,787,the disclosure of which is incorporated herein by reference, by extending its advantages to cars with drop center or stub center sills and by improved structure facilitating end of car installation on existing cars.

In the drawings, FIG. 1 is a diagrammatic view of end of car installation, FIG. 2 is a diagrammatic view of a modification in which the draft gear and cushion units are separate assemblies, FIG. 3 is a diagrammatic view of another modification in which the draft gear is within the sill, FIG. 4 is a section on line 4–4 of FIG. 5 of the draft gear assembly and one end of the cushion assembly, the structure being similar to FIG. 2, FIG. 5 is a top plan view of the FIG. 4 draft gear assembly and one end of the cushion assembly, FIG. 6 is an exploded view of the draft gear and cushion assemblies, FIG. 7 is a top plan view of the cushion assembly, FIG. 8 is a side elevation of the cushion assembly, FIG. 9 is a transverse section through the cushion assembly, FIG. 10 is a top plan view of the yoke connecting the draft gear and cushion assemblies, FIG. 11 is a side elevation of the connecting yoke, FIG. 12 is an end view of the connecting yoke, FIG. 13 is a top plan view of the structure for attaching the cushion assembly to the connecting yoke, FIG. 14 is a side elevation of the FIG. 13 attaching structure, FIG. 15 is a top plan of the draft gear carrying slide, FIG. 16 is a side elevation of the slide, FIG. 17 is a top sectional view of a structure based on FIG. 3, and FIG. 18, is a sectional side elevation of the FIG. 17 structure.

In FIG. 1 there is shown a freight car 1 having stub center sills 2, 3 at opposite ends. The center section of the car could be a tank car, a drop center frame or other construction using stub center sills. Associated with each sill is a coupler 4, a draft gear 5, and a cushion unit 6 comprising longitudinal beams 7 and 8 respectively preloaded against stops 9 and 10 on the center sill by an elastomeric shear sandwich means 11 having a body 12 of elastomer sandwich between and bonded to plates 13 and 14 respectively fixed to the beams 7 and 8.

In draft, the performance is the same as a standard freight car. The beams 7 and 8 remain stationary and the draft gears provide the customary spring and friction load transmitting connection. The draft gear provides limited travel D, typically 2 ¾" for an AAR standard draft gear, and somewhat more for an ARR long travel draft gear.

In buff, the draft gears 5 are effective in the usual manner providing the spring and friction travel D and each cushion unit now becomes effective as soon as the inward force on its beam 7 exceeds the preload force of its shear sandwich 11 to provide an additional cushioned travel C equal to the distance between stops 15 and 16 respectively on the beams 7 and 8. The additional travel C provided by each cushion unit, which, for example, may be from 8 to 12 inches, furnishes added protection for the car structure and its lading. Under a squeeze force applied to the coupler at opposite ends of the car, the total cushioned travel will be 2D from the draft gears 5 plus 2C from the cushion units 6.

FIG. 2 shows schematically an end of car unit for a freight car 1*a* having stub sills at opposite ends, only one of which, the sill 2*a*, is shown. The car has the usual coupler 4*a* and draft gear 5*a* which is shown in the unloaded position where it projects outside the outer end 17 of the sill and is supported by a slide 18 having a stop 19 spaced a distance C from the outer end of the sill. In draft, the coupler 4*a* and slide can move outward a distance D from the position shown. In buff, the slide 18 can move inward a distance C and the coupler 4*a* can move inward a distance C plus D from the position shown. Attached to the draft gear 4*a* and projecting therefrom into the stub sill 2*a* is a connector structure 20 also supported by the slide 18 and having at its inner end a hook 21 received in an eye 22 in a beam 23 having a stop 24 cooperating with a stop 25 on the sill to limit outward movement of the beam. The beam is normally biased outward by cushion unit 6*a* having a plurality of elastomeric shear sandwiches 11*a* connected between the beam 23 and upper and lower beams 26 and 27 which are at all times in fixed relation to the sill, for example by engagement of the inner ends with stops 28 and 29.

In draft, the draft gear 5*a* provides the usual travel D and the cushion unit 6*a* is inactive. In buff both the draft gear and the cushion unit are effective providing a travel of C plus D. At maximum buff, stop 19 engages the outer end 17 of the sill, the coupler 4*a* engages the stop 19 and stop 30 on the connector 20 engages stop 31 on the sill.

FIG. 3 shows another end of car unit for a car 1*b* having stub sills, only one of which, the sill 2*b* is shown. The car has the usual coupler 4*b* and draft gear 5*b* which is mounted in its usual position within the sill. An elongated shank 32 on the coupler extends slidably through a slide 33 to the draft gear. In the unloaded position shown, the coupler 4*b* is spaced a distance D and the slide is spaced a distance C from the outer end 34 of the sill.

In draft, the draft gear 5*b* functions in its usual manner as the sole cushioning means and providing travel D. In buff, forces are transmitted through connecting structure 35 to a cushion unit 6*b* comprising a center beam 36 and elastomeric sandwich means 11*b* connected between the beam 36 and upper and lower beams 37 and 38 which are at all times held in fixed relation to the sill by stops 39 and 40. The sandwich means 11*b* bias the beam 36 and the draft gear 5*b* outward against a stop 41 on the sill.

The operation is similar to FIG. 2. In draft, only the draft gear 5 is effective providing a maximum travel D. In buff the cushion unit 6*b* supplements the draft gear providing a maximum travel of C plus D. At maximum buff, the coupler 4*b* engages the slide, the slide 33 engages the outer end 34 of the sill 2*b* and a stop 42 on the draft gear engages a stop 43 on the sill.

FIGS. 4 through 16 show an end of car unit generally similar to FIG. 2 and containing features which are also of utility in cars with straight through sills.

Referring first to FIG. 6, which shows the component parts of the unit, the coupler 44 (corresponding to 4*a*) has a shank 45 connected by pin 46 to draft gear yoke 47. The ends of pin 46 slidably engage sides 48 on slide 49 which hold the pin in place. Draft forces are transmitted from the coupler 44 through pin 46 and yoke 47 to seat 50 on the yoke which engages seat 51 on draft gear housing 52 containing the usual spring and friction devices between it and plunger 53 engaging follower block 54. The follower block 54 engages seats 55 on connector yoke 56 which is stopped from movement in the draft direction by travel stops 57 (FIG. 4) in the sides 58 of the sill 59. Buff forces are transmitted from the shank 45 through pin 46 to yoke 47, follower block 54 and plunger 53 to the draft gear mechanism within housing 52. Seat 51 of the housing transmits buff forces through seats 60 on the connector yoke 56. At the inner end of the connector yoke 56 is a hook 61 corresponding to the hook 21 in FIG. 2 which fits in an eye 62 fixed to the front end of an H-beam 63. The eye 62 is part of a casting fixed to the H-beam 63 and having stops 64 cooperating with the travel stops 57 (FIGS. 4 and 5). Above and below the center web 65 of the H-beam are channels 66 and 67. Channel 66 has a bottom wall 68 and downwardly presented side flanges 69 with edges above and registering with upwardly presented flanges 70 on the H-beam 63. Channel 67 has a bottom wall 71 and upwardly presented side flanges 72 registering with downwardly presented flanges 73 on the H-beam 63. At the front of the channel 66 is a forwardly extending tongue 74 to the underside of which is bonded a body 75 of elastomer (FIG. 4). The lower side of the body 75 is bonded to a plate 76 bolted to the upper side of the horizontal web 65 of the H-beam 63. This provides a shear sandwich mounting corresponding to one of the mountings 11*a* in FIG. 2. There is no shear sandwich mounting on the underside of the web 65 directly below the tongue 74 in order to provide clearance for the car center plate 77. Behind the tongue 74 are three or more pairs of sandwich mountings, each comprising a body 78 (FIG. 9) of elastomer bonded to the bottom wall 68 of the channel and bonded to a plate 79 bolted to the upper side of the horizontal web 65 of the H-beam. On the

channel 67 are three or more pairs of sandwich mountings each comprising a body 80 of elastomer bonded to the upper side of the horizontal web 71 and to the plate 81 bolted to the under side of the horizontal web 65 of the H-beam. The back ends of the channels are preloaded against stops 82, 83 (FIG. 8) fixed to the sill 59.

In the assembly, the H-beam 63 and the channel 66, 67 comprises a subassembly which is slid into the stub sill 59. The coupler 44, the yoke 47, the draft gear 51—54, the slide 48, 49 and the connecting yoke 56, comprises a subassembly which is then lifted into place engaging the hook member 61 with eye 62. A support strap 84 is fixed to the bottom of the stub sill. As initially installed, the mountings are not preloaded. Preloading is effected by an axial force applied, for example, through the coupler which forces the H-beam 63 back until the openings in the stub sills for the travel stops 57 are uncovered. The travel stops are them inserted through the sides of the sill.

The operation is similar to FIG. 2. In draft, the draft gear 51—54 provides the usual travel D (FIG. 5) and the cushion unit consisting of the H-beam 63, the channels 66, 67 and the associated shear sandwich mountings is inactive. In buff both the draft gear and the cushion unit are effective, providing a travel of C plus D. At maximum buff, stop 85 engages the outer end of the stub sill 59, the inner end 86 of draft gear yoke 47 engages a seat 87 on the connector yoke 56, and stop surfaces 88 on the inner end of the connector yoke 56 engage travel stops 57.

In draft, the normal cushion and friction action of the draft gear is effective. In buff, the cushion action of the draft gear is supplemented by the cushion unit. If desired, additional friction may be provided by friction elements 89, 90. (FIG. 9) respectively on the lower edges of the flanges 69 of the channel 66 and the upper edges of the flanges 70 of the H-beam 63 and also by friction elements 91 and 92 respectively on the lower edges of the flanges 73 of the H-beam and the upper edges of the flanges 72 of the channel 67. Since the elastomer decreases in thickness under shear strain, the friction elements 89, 90 and 91, 92 have increased pressure and, therefore, increased friction as the deflection increases. This provides greater energy absorption for the large forces.

FIGS. 17 and 18 are views similar to FIGS. 4 and 5 of a modification of an end of car unit which uses the same basic structural elements of FIGS. 4—16 but which sets the draft gear deeper into the sill so as to eliminate the need for a connector yoke between the draft gear and the cushion unit.

In this modification, the coupler is the same as in FIGS. 4—16 and has its shank 45 connected by the pin 46 to a slot 47 in a draft gear yoke 93. The pin 46 is slidably confined between the sides 48 of a slide 49. The draft gear unit 51, 52, 53 is the same and has its seat 51 seated on a seat 94 on the yoke 93 which corresponds to the seat 50 of the yoke 47. Instead of the follower block 54, there is now a follower block casting 95 having its inner end bearing against the draft gear plunger 53 and normally held against draft s tops 96 on the side sill. The casting 95 has an extension 97 which bears in thrust relation on the inner end of the coupler shank 45. In draft, force is transmitted from the coupler shank 45 to the yoke 93 and from the yoke through the seat 94 to the draft gear and associated stops 96.

The cushion unit comprises the same H-beam 63 and channels 66, 67 with the associated shear sandwich mountings. The principal difference is in the omission of the connector yoke 56 and the hook and eye connection 61, 62 and the substitution of an intermediate thrust member 98 in compression relation between the H-beam 63 and the seat 51 on the draft gear. The initial preload of the shear sandwich mountings, which tends to move the H-beam 63 to the left as viewed in FIG. 18, is transmitted through the member 98 and seat 51 to the draft stops 96. At maximum buff, a stop surface 99 on the draft gear yoke bottoms against a stop surface 100 on the part 98 and stop surfaces 101 on the part 98 bottom against the buff travel stops 57.

The units shown are for the standard width of center sill to permit installation with a minimum of modification of existing cars. On new car construction, a wider sill could be used to permit a different arrangement of the sandwich mountings. For example, in a wider sill, several mountings could be arranged side by side so as to reduce the overall length of the unit.

I claim:

1. An end of car draft and cushion unit for a railway car having a sill with an open end at one end of the car, a draft gear having travel in draft and in buff relative to said open end of the sill, an elastomeric shear sandwich mounting within said open end of the sill having a pair of members anchored to spaced portions of a body of elastomer which is stressed in shear by relative movement of said members along the axis of the sill, a coupler outside the sill, means for connecting the coupler in draft and buff thrust relationship to the draft gear, stop means on said sill at said one end of the car for receiving draft forces from the draft gear, means for connecting one of said pair of members in fixed relation to the sill at said one end of the car, means for connecting the other of said pair of members in buff stress receiving relationship to the draft gear whereby the elastomer is stressed in shear by buff stresses to provide cushion travel in addition to the draft gear travel, said coupler being spaced from said one end of the sill to accommodate draft gear and cushion travel, and said body of elastomer being initially stressed to hold the draft gear against said stop means.

2. The unit of claim 1 in which the draft gear has a yoke connected in draft and buff relationship to the coupler and in which the means for connecting the other member in buff stress receiving relationship to the draft gear comprises a thrust member in thrust relation between the yoke and the other member, said yoke and said thrust member being movable relative to each other, said yoke and sill having stops engaging to limit the movement of the yoke relative to said thrust member in buff.

3. The unit of claim 1 in which the draft gear has a yoke connected in draft and buff relationship to the coupler and in which the means for connecting the other member in buff stress receiving relationship to the draft gear comprises a second yoke in draft and buff relation to the draft gear and to said other member, said yokes being movable relative to each other and having stops engaging to limit the movement of the draft gear yoke relative to the second yoke in buff.

4. An end of car draft and cushion unit for a railway car having a sill with an open end at one end of the car, a draft gear having travel in draft and in buff relative to said open end of the sill, a plurality of elastomeric shear sandwich mountings within said open end of the sill arranged respectively above and below an H-beam extending lengthwise of the sill and between said H-beam and upper and lower channels extending lengthwise of the sill and having flanges presented to and frictionally engaging upper and lower flanges of said H-beam, each mounting having a body of elastomer which has spaced portions anchored respectively to said H-beam and to one of the channels and which is stressed in shear by relative movement of said channels and H-beam along the axis of the sill, a coupler outside the sill, means for connecting the coupler in draft and buff thrust relationship to the draft gear, stop means on said sill at said one end of the car for receiving draft forces from the draft gear, means for connecting said channels in fixed relation to the sill at said one end of the car, means for connecting said H-beam in buff stress receiving relationship to the draft gear whereby the elastomer is stressed in shear by buff stresses to provide cushion travel in addition to the draft gear travel, said coupler being spaced from said one end of the sill to accommodate draft gear and cushion travel, and said bodies of elastomer being initially stressed to hold the draft gear against said stop means.

5. The unit of claim 4 in which the upper channel and H-beam extend over the car center plate and the lower channel is inward of the car center plate.