Oct. 31, 1961 W. E. BAILLIE ET AL 3,006,483

RAILWAY CAR UNDERFRAME ARRANGEMENT

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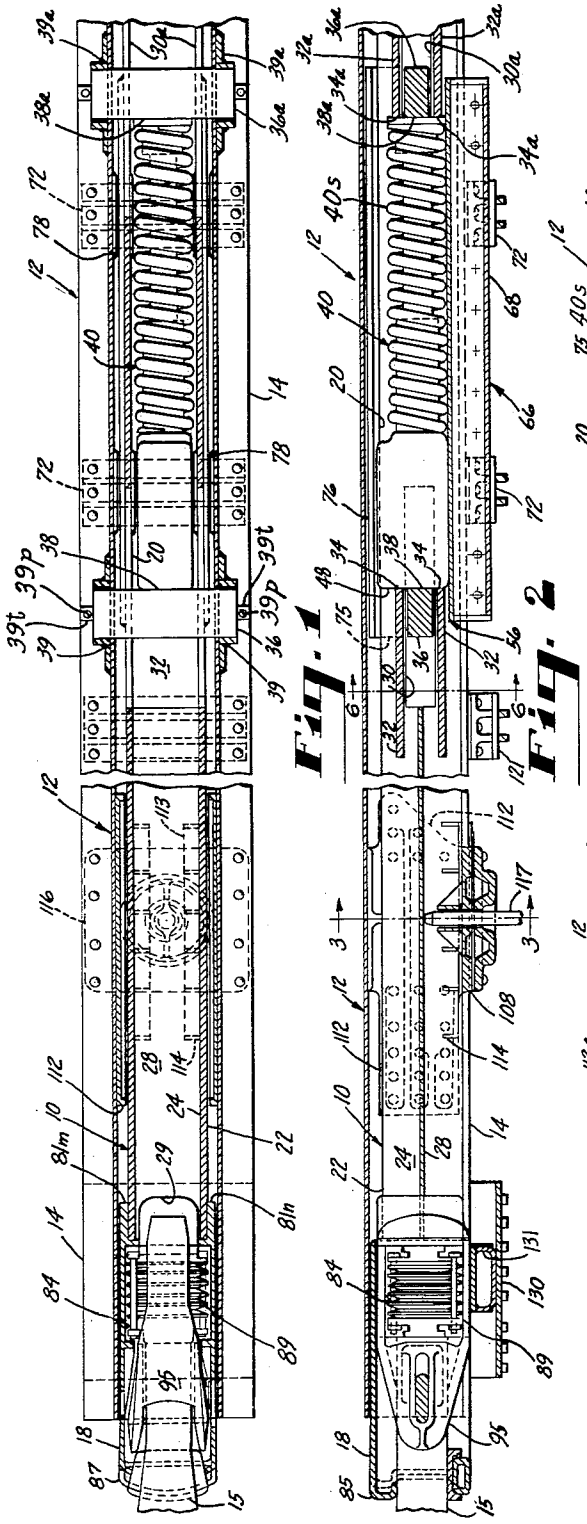


Fig. 1

Fig. 2

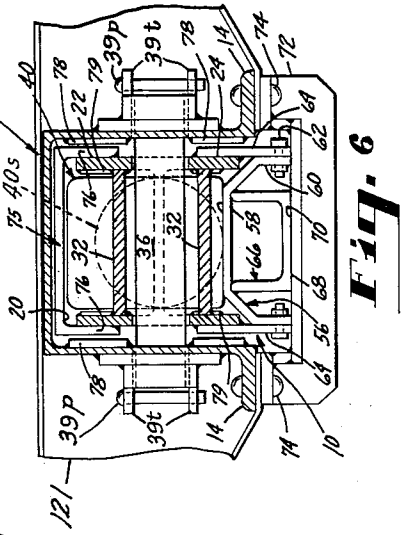


Fig. 6

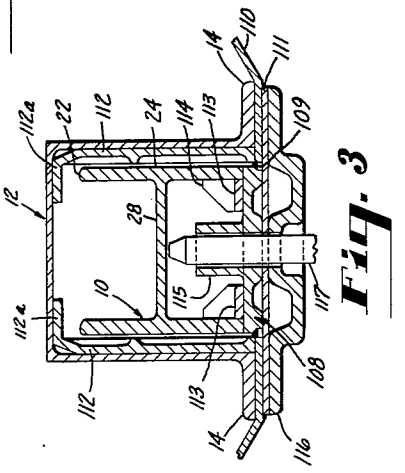


Fig. 3

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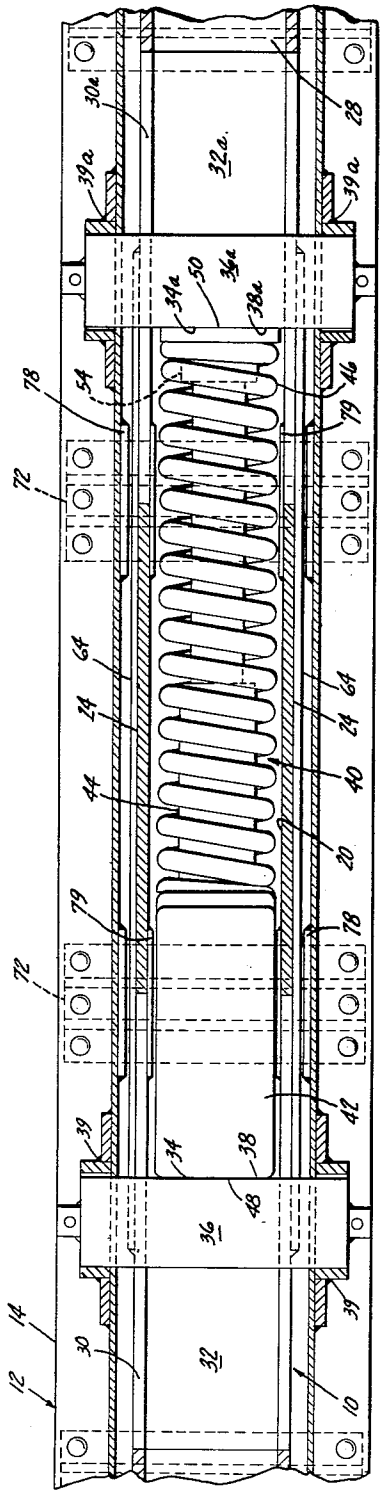


Fig. 4

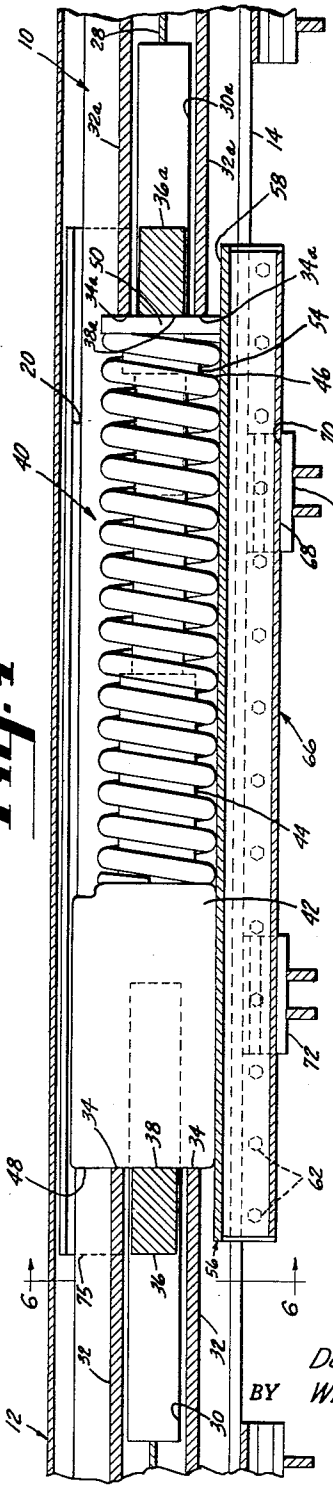


Fig. 5

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RAILWAY CAR UNDERFRAME ARRANGEMENT

Filed July 6, 1959 5 Sheets-Sheet 3

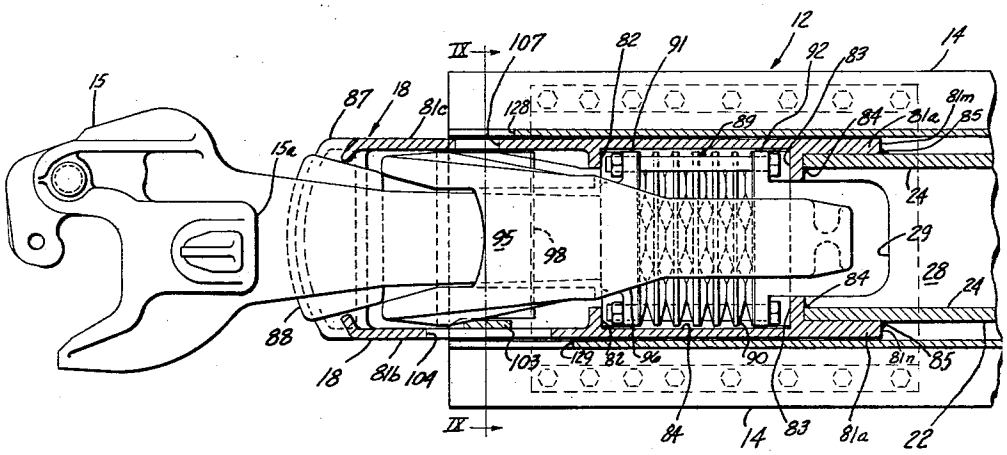


Fig. 7

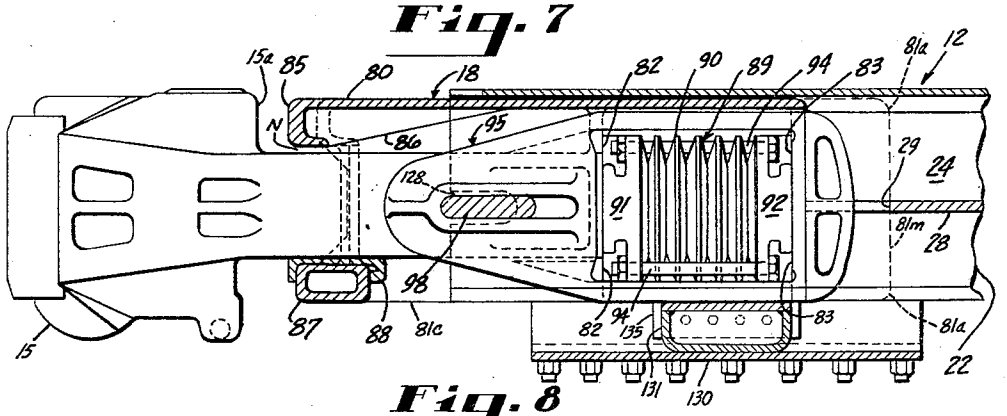


Fig. 8

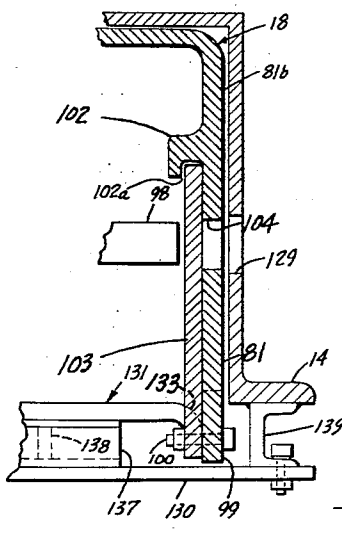


Fig. 9

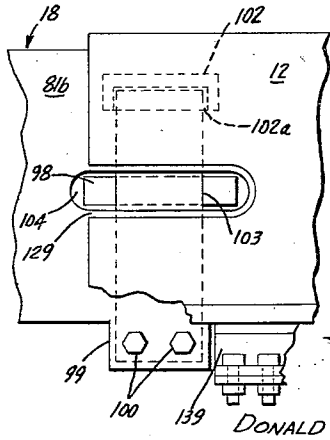


Fig. 10

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RAILWAY CAR UNDERFRAME ARRANGEMENT

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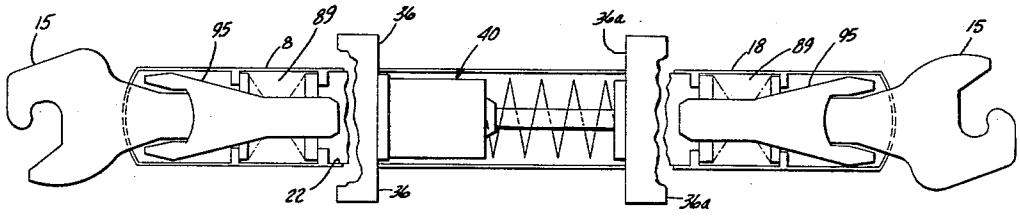


Fig. 13

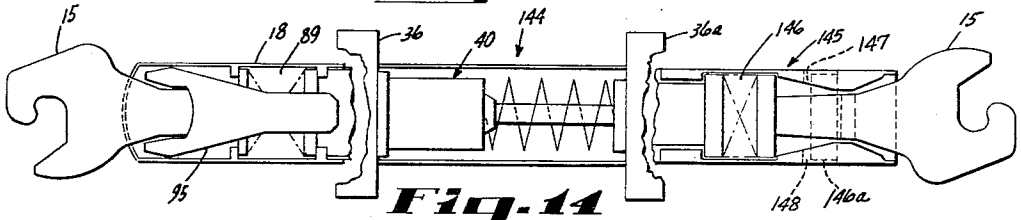


Fig. 14

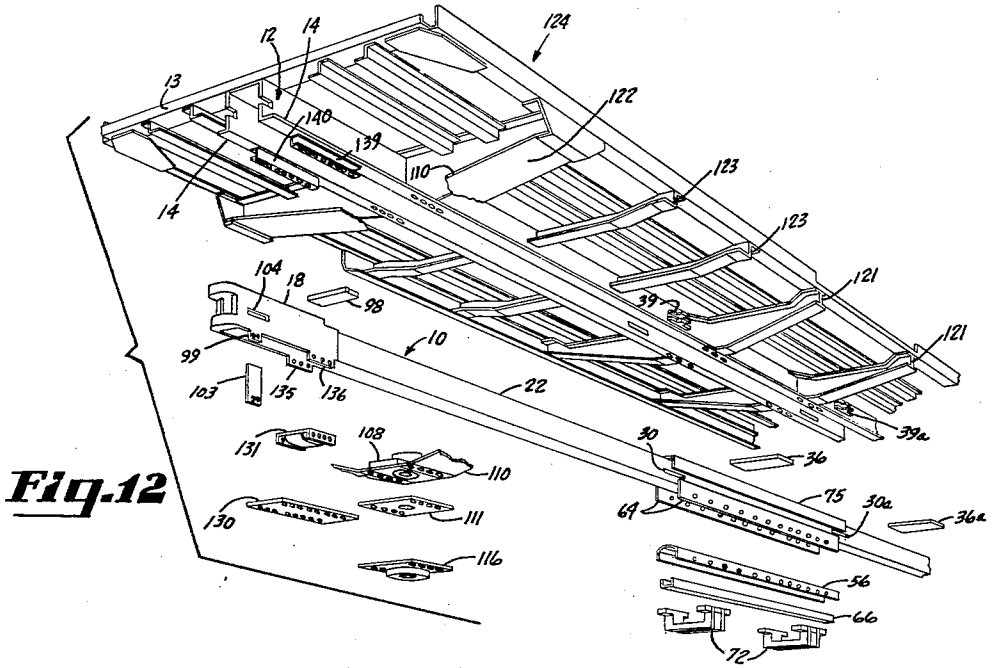


Fig. 12

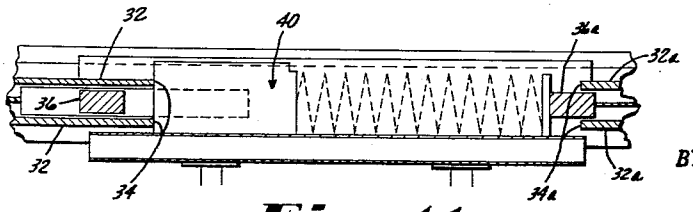


Fig. 11

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RAILWAY CAR UNDERFRAME ARRANGEMENT

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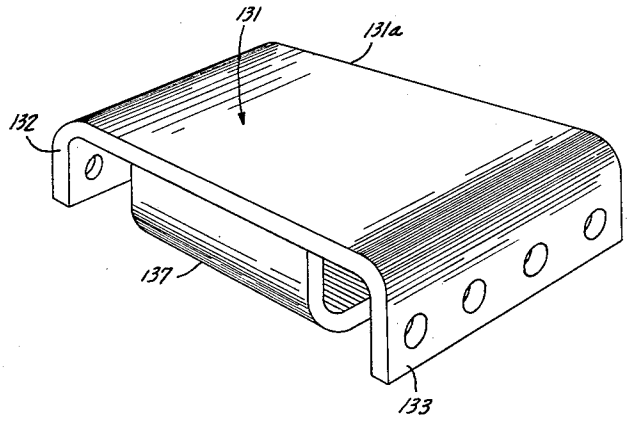


Fig. 15

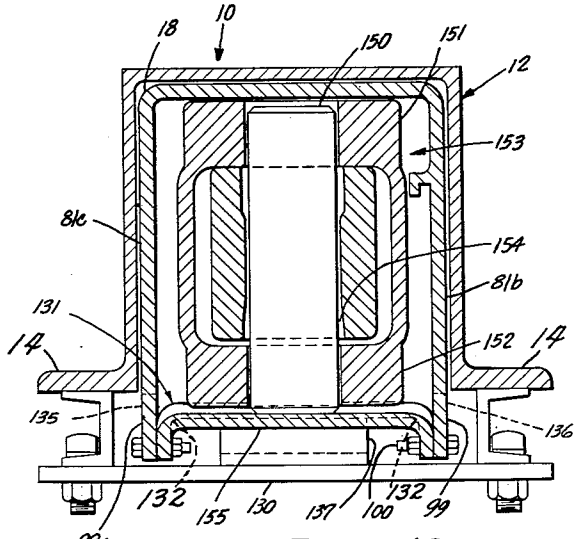


Fig. 16

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3,006,483

RAILWAY CAR UNDERFRAME ARRANGEMENT

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Filed July 6, 1959, Ser. No. 825,043
11 Claims. (Cl. 213—8)

This invention relates generally to railway car cushioned underframe construction, and particularly to that type of cushioned underframe in which a fixed center sill supports a draft and buffing column or sliding sill in longitudinally slidable relationship therewith.

Various arrangements of an underframe in cushioned relation with a buffing column have been proposed for use by the industry. It is, of course, the purpose of all cushioned underframe constructions to protect the underframe of the railway car and its lading against damage or distortion as a result of the occasionally great forces or shocks to which a car is usually subjected during normal service.

In some of the prior art arrangements employing a sliding sill, it is necessary that the fixed center sill and the car underframe be especially constructed to accommodate the sliding draft and buffing column (hereinafter called "draft column"). In another arrangement, existing fixed center sills may be adapted to receive a sliding draft column. Neither of these general arrangements, however, has been generally accepted by the industry. Special constructions, such as these, involve economic considerations which are adverse to possible wide use of the sliding draft column arrangement. In general, the modifications thus far proposed, adapting existing center sills for use with a sliding sill or column, have proven not only uneconomical but weakening to the car and frame structure as a whole.

It is a primary object of this invention to provide improved railway car underframe structure utilizing a sliding draft column and conventional center sill construction to the fullest extent practicable.

Another object is to provide railway car underframe structure utilizing the sliding draft column principle but maintaining the structural strength afforded by, for example the conventional A.A.R. standard car construction in which train forces are transmitted directly into the car frame through the draft gear at either end thereof.

A further object is to provide a sliding draft column which is economically practicable for installation in existing fixed center sills through the use of standard structural components, including draft gear yokes and cushioning elements in commercial use, within the draft column, and the utilization of the entire length of such sills.

These and other objects are achieved by the present invention in railway car underframe structure comprising a hollow center sill running the full length of the underframe, and a draft (and buffing) column of greater length than the center sill supported in the latter; the column being resiliently connected with the center sill centrally of the underframe and being suitably constructed to be housed within the center sill with end portions of the column protruding from either end of the center sill.

For maximum strength and rigidity in the underframe, and for maximum lateral reinforcement and support of the draft column, the center sill extends from one end-sill of the frame to the other and is joined fixedly to the cross-members such as body bolsters, cross-bearers, and cross-ties. Each end portion of the column, although telescopically related to the end portion of the center sill, includes spaced stops defining a pocket for receiving a draft gear and a yoke resiliently connecting a coupler to the column at each of its ends. Each end portion further provides an end wall of which its outer surface is suitable

for use as a striker face and has an opening for accommodating the shank of a coupler.

In a preferred embodiment, the center sill has a uniform internal periphery and the end portions of the column are arranged to be generally complementary in external periphery to the interior of the center sill in a manner allowing the column to loosely slide within the center sill.

In the drawing with respect to which this invention is described:

FIG. 1 is a fragmentary shortened plan view with parts in section showing the fixed center sill, the sliding draft column, the center cushioning mechanism, and the end draft cushioning units in accordance with this invention.

FIG. 2 is a fragmentary elevation in section with vertical lateral walls of the center sill and the column removed to expose interior mechanisms.

FIG. 3 is an enlarged sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is a plan view, with parts sectioned at an intermediate elevation, of the center-sill cushioning assembly which connects the fixed center sill with the draft column.

FIG. 5 is an elevation with parts in section of the assembly of FIG. 4.

FIG. 6 is a sectional view taken along line 6—6 of FIGS. 2 and 5 with abutment portions shown in dotted lines.

FIG. 7 is a fragmentary plan view with parts in section of an assembly including a coupler, the end portion of the draft column, the fixed center sill, and draft gear for connecting the column and the coupler.

FIG. 8 is an elevation with parts in section of the assembly shown in FIG. 7.

FIG. 9 is a fragmentary sectional view taken along line IX—IX of FIG. 7.

FIG. 10 is a fragmentary side view of the center sill and column structure, shown in FIG. 9.

FIG. 11 is a schematic elevation in section showing the center cushioning assembly with the draft column out of neutral position, and the cushioning mechanism in a compressed condition.

FIG. 12 is an exploded perspective view of the greater part of a car understructure incorporating the present invention but not including the cushioning mechanisms used therein.

FIG. 13 is a shortened schematic view in plan of the draft column and couplers connected therewith of the embodiment shown by FIGS. 1 to 12.

FIG. 14 is a shortened schematic view in plan of a draft column and couplers connected therewith in accordance with another embodiment of the invention.

FIG. 15 is a perspective view of a runner shown removed from its position in the draft column underneath the yoke and draft gear shown in FIG. 8.

FIG. 16 is an elevation in transverse section illustrating the draft column with a coupler shank and yoke connected by a vertical pin.

As shown in FIGS. 1 and 2, a fixed center sill **12** of uniform internal U-shaped periphery supports a column **10** in longitudinal slidable relationship therewith. The fixed sill **12** herein shown is a conventional type formed to open downwardly, e.g., by the welding of two Z-beams together, and it is of inverted U-shape cross section with flanges **14** extending from the side walls of the sill laterally toward the sides of the railway car. For adapting it in a condition to receive the draft column **10**, the sill **12** is clear of all interior structure and extends the full length of the railway car to terminate coincident with, or slightly beyond, the end sills of the underframe (see sill **13** in the foreground of FIG. 12). As shown in FIG. 12, the center sill **12** is joined, as by welding, to the various underframe structural members, such as cross bearers

121, body bolsters 122 and cross-ties 123 of the underframe 124.

The present invention is intended to make full use of the strength and rigidity inherent in conventional railway car underframes having a full length sill, and to maintain all rigid connections of a center sill with all lateral frame members which are deemed to add materially to the overall strength of the underframe. The structure, in accordance with this invention, is duplicated in opposite ends of the underframe with none of the figures in the drawing embracing more than about sixty percent of the car length except FIG. 13 which is a longitudinally shortened view including both ends of the sliding draft column 10 and associated couplers 15.

The draft column 10 is of one piece or unitary construction which may be either cast or fabricated, and comprises a draft gear pod 18 disposed at each end of an H-beam 22. The beam 22 extends continuously between the pods 18 secured thereto as by welding. The H-beam 22 is oriented within the sill 12 with the widths of its flanges 24 aligned vertically and the width of its web 28 aligned horizontally.

FIG. 1 shows the web 28 having a notch 29 at its left end in the portion of the H-beam or member 22 which extends into the rear end of the pod 18. The notch 29 accommodates the rear end of the yoke 95. The web 28 extends longitudinally inwardly toward the center of the column to the outward extremities of two laterally opposed slots 30 in the flanges 24 vertically centered with respect to the horizontal plane of the web. The slots 30 displace portions of the web 28. In a like manner, the web 28 extends from the pod at the opposite end of the column to the longitudinally other ends of a pair of laterally opposite slots 30*a* in the flanges 24. Slots 30*a* are similar in length and vertical disposition to slots 30. The spacing of slots 30 with respect to slots 30*a* is determined by the length of the cushioning unit 40 to be used in absorbing forces transmitted from the column 10 to the center sill 12. When the column is positioned within the center sill these slots receive horizontally transversely aligned keys 36, 36*a*, extending through laterally opposed openings in side walls of the center sill. For supporting the keys 36 and 36*a*, the side walls of the sill 12 have bearing portions 39 fixed thereto which fit neatly about the keys but permit the keys to be slid easily in a lateral direction from the sill. The bearing portions 39 terminate laterally in tabs 39*t* having apertures to which pins 39*t* extend. These pins retain the keys 38 and 38*a* within the center sill.

The longitudinally inward abutment surfaces 38 and 38*a* of the keys 36 and 36*a* define the longitudinal extremities of a pocket 20 in which the center shock-absorbing gear or cushioning unit 40 is supported at a neutral position of the column 10 relative to the sill 12 (see FIGS. 1, 2, 4, 5). At this neutral position, the opposite ends of the central cushioning unit, i.e., the unit 40, engage end surfaces 34, 34*a* of spaced pairs of webs 32, 32*a*, of which respective abutment surfaces 34, 34*a* have the same spacing as abutment surfaces 38 and 38*a* of the keys 36 and 36*a*. Hence, at the neutral position, surfaces 34 and 38 are in vertical alignment; and the surfaces 34*a* and 38*a* are also in vertical alignment. Also, at these positions the keys 36 and 36*a* are disposed approximately midway of the length of the slots 30 and 30*a* in which they are positioned.

The webs 32 and 32*a* are disposed in parallel pairs approximately parallel to the web 28. The webs of either pair (32 or 32*a*) are spaced so that one web extends between the opposite flanges of the beam at a level just above the adjacent pair of slots (30 or 30*a*) and the other web is disposed below the slots. Thus, the webs of either pair are vertically spaced to receive a key 36 or 36*a* therebetween. These webs are connected with the flanges 24 as by welding. Through this arrangement, the cushioning unit 40 will be shortened and compressed (looking now at FIGS. 1 and 2) between the abutment webs 32 and the key 36*a* in movement of the column 10 to the left relative to the fixed sill 12. In movement of the column 10 to the right, the unit 40 will be compressed between the key 36 and the abutment webs 32*a*. The abutment webs move out of vertical alignment with the respective adjacent keys in the manner shown in FIG. 11.

The cushioning unit 40 may be of any suitable type but in the embodiment shown, the unit is of the hydraulic spring-return type comprising a liquid reservoir 42, and a plunger or piston 44 encircled by a coil spring 46. As shown, the spring 46 is maintained in a condition of compression and reacts at one end with a shoulder of the reservoir 42 and, at the other end, with head 50 of the plunger. The reservoir 42 has a flat base portion 48 abutting against the surfaces 34 and 38 (at the neutral position of the column); the head 50 of the plunger abuts against the other set of surfaces 34*a* and 38*a* at the neutral position.

The unit 40 is supported from underneath by a support plate 56 of substantially inverted U-shape cross section to provide a platform 58 on which the unit 40 rests. The plate 56 is secured by its side webs 60 in rigid attachment by bolts 62 to a pair of plate extensions 64 welded to outside surfaces of the sliding sill flanges 24. An upright channel bar 66 extends longitudinally under the channel 56 in reinforcement thereof. The bar 66 is oriented with its transverse cross section forming an upright-U, thereby disposing the flat surface 68 in downwardly facing attitude for slidingly engaging the surfaces 70 on upper flat surfaces of longitudinally spaced retainer brackets 72. The brackets 72 extend transversely underneath the column 10 and are rigidly connected as by rivets 74 to the lateral flanges 14 of the sill 12.

The column 10 further comprises covering structure for the draft gear 40 in the position thereof between the webs 32 and 32*a* in the form, for example, of a channel 75 having its flanges 76 secured as by welding to the outer surfaces of both flanges 24 of the member 22. The channel 75 stiffens the column along its middle portion and, in addition, serves as a ceiling against which to secure the unit 40. Furthermore, as the channel 75 is secured to the beam 22 at close clearance with the top wall of the center sill 12, the channel 75 serves to eliminate any vertical movement such as vibration or upward buckling to which the column 10 might be otherwise subjected. If desired, a spacer or guide plate 78 may be welded to each lateral interior surface of the side walls of the sill 12 to protect against undesirable rocking or twisting of the column 10 relative to the sill. To assure alignment of the unit 40 within the pocket 20 of the column, shims or plates 79 may be welded to the inner side surfaces of the side flanges 24.

In the embodiment shown, the pod 18 (see FIGS. 7 and 8) is a casting having a top wall 80 and side walls 81*b*, 81*c*. Interiorly, the pod 18 has vertically-extending, mutually-facing front stops 82 and rear stops 83 projecting laterally inwardly from the side walls 81*b*, 81*c* to define a draft gear pocket 84 substantially shorter than the pocket 20 arranged centrally of the car frame for receiving the unit 40. The side walls 81*b*, 81*c* are extended longitudinally inward as portions 81*a* adapted to overlap the flanges 24 of the member 22. Welds at 84 and 85 firmly attach the pod 18 to the member 22. The lengths of the member 22 and the pods 18 at each end of the member, and the relative lengths of the resulting column and the center sill, are such as to dispose the pods substantially but not completely interiorly of the sill, i.e., in telescopic relationship at neutral position.

Wall portions 81*a* have rearward-facing surfaces 81*m* and 81*n* spaced, e.g., in the present embodiment, about 12 inches from the frontward facing end surfaces of the cheek plates 112. End surfaces 81*n* and 81*m* of each pod and the adjacent set of cheek plates 112 in respec-

tive ends of the sill **12** constitute stop means defining the range of travel of the column **10** with respect to the sill **12**.

The pod **18** has a forward end wall **85** of horizontally convex contour which merges curvately with the top wall **80** and side walls **81** of the pod. The front face of the wall **85** serves as a striker surface for receiving the horn **15***a* of the coupler **15** if the severity of the buffing action so requires. The buffing wall **85** provides an opening N through which the shank of the coupler **15** extends rearwardly into a yoke **95** with which it is connected by a key **98**. The wall **85** merges underneath the opening N in a box section **87** which serves as a coupler carrier. The box section **87** may be covered as shown with a wear plate **88** on which the coupler rests. Similar to the center sill **12**, the pod **18** is of inverted U-shape transverse cross section to provide an open bottom for the installation and removal of draft gears, such as the cushioning unit **89**.

In effecting an essential purpose of the present invention, i.e., the protection of car structure and lading from the impacts sustained, for example, in car classifying and train forming or handling operations, the central gear **40** is intended to function as a primary cushioning agent for reducing the forces developed between the cars and between the lading and end wall of each car. Hence, the draft gears **89** in each end of the column **10** may be designed primarily for protecting the column and the associated couplers from excessive draft or buff forces developed when the cars are being moved in long trains. Such draft gears need not be designed for protection of the lading. Such protection is derived from the unusually large capacity of the center gear **40**. Hence, the gears **89** herein disclosed are of smaller cushioning capacity than the center gear **40** and also smaller than the standard draft gears in use on cars having draft gear pockets having fixed positions within the car frame.

Accordingly, the stops **82** and **83** of the draft gear pocket within the pods **18** may be spaced to define a pocket of shorter length than that provided on the standard cars of American railways. The draft gear **89** and the yoke **95** which encircles it are of standard design except for shortening entailed by the shortened draft gear pocket. The draft gear **89** is illustrated as comprising pads **90** of well-known commercially-available rubber and steel construction positioned in a state of initial compression between a forward follower **91** and a rear follower **92**. Bolts **94** maintain the gear in an assembled condition when outside the pocket.

To remove or replace either the coupler **15**, the yoke **95**, or a draft gear **89**, it is necessary to remove the key **98**. Because of the reciprocable telescoping relation of the draft column **10** with the fixed center sill **12**, it is necessary that the key **98** be confined within the lateral limits of the side walls of the pod **18**; protrusion of this key laterally from the pod would result in undesirable interference of a key portion with the walls of the pod **18** or with parts of the center sill, and possibly, loss of the key from its position for connecting the yoke and the coupler. As the key **98** undergoes movement relative to the walls of the pod during compressive cycles of the gear **89**, the key must also be arranged within the interior of the pod **18** to have unimpeded movement therewithin.

To enable removal and installation of the key **98**, the side walls **81***b* and **81***c* of the pod **18** are provided with openings **104** and **107**, respectively. Both openings occur at a level placing them horizontally opposite adjacent ends of the key **98**, as shown in FIGS. 7 and 8. The opening **107** is smaller than the adjacent end surface of the key, so that the key will be prevented from passing out through the wall **81***c*. As shown, the center sill **12** has slots **128** and **129** in laterally opposite relation with openings **107** and **104**, respectively, when column **10** is in its neutral position (see FIGS. 7, 9, and 10). A tool may be inserted through the slot **128** of the sill **10** and the opening **107** in the pod wall against the end surfaces of the key for pushing the key through the opening **104** at the other side of the pod and the adjacent slot **129** of the sill.

The key **98** is confined within the pod **18** by a lock plate **103** secured along the inner surface of the wall **81***b* of the pod **18** centrally over the opening **104** and centrally with respect to the normal ambit of the key **98**. To facilitate the removal of the lock plate **103**, the wall **81***b* is extended as a lug **99**. In its operative position, the plate **103** has its top end portion positioned in a pocket **102***a* formed by a lug **102** along the inner surface of the wall **81***b*. At this position, the plate and the lug **99** have holes in horizontal registry for receiving two bolts **100** by which the plate **103** is secured to the pod wall. The plate **103** is of sufficient width to remain in overlapping relation with the end surface of the key at all possible conditions of compression of the draft gear **89** resulting in rearward or forward displacement of the key and the associated yoke **95**.

The coupler **15** is supported by the box frame portion **87** of the front end of the pod **18** and the key **98** in place within the slots therefor within the head of the yoke **95** and the coupler butt.

Each end portion of the column **10** is supported by a plate **130** bridging the open underside of the center sill **12** and fixedly secured thereto directly under each pod **18**.

To avoid any undesirable wear condition in supporting the end portion of the column **10**, it is desired to avoid frictional sliding contact of the lower edges of the walls **81***b* and **81***c* upon a supporting medium, such as the plate **130** bolted as shown, to flanges **14** of the fixed sill. Accordingly, each pod **18** of the column **10** is provided with a runner **131** comprising a plate **131***a* having lateral downturned edge portions **132** and **133** adapting the runner to be bolted to downwardly extending tab-like extensions **135** and **136** of walls **81***b* and **81***c*, respectively. The runner **131** further comprises a shoe **137** reinforced by a central web **138** which rides upon the plate **130** during movement of the column **10** relative to the sill **12**. As drawn, the runner **131** is approximately 8 inches in length. As the travel of the draft column **10** with respect to the sill **12** is in the order of 24 inches, the plate **130** has a minimum length of approximately 20 inches with its length centered with respect to the length of the shoe at the neutral position of the column in order that overlapping relation of the shoe with the plate will be assured at all positions of the column **10** within its ambit relative to the sill **10**.

The yoke **95** rests upon and is supported by the plate portion **131***a* of the runner. The yoke is reciprocable in respect to the plate **131***a* to an extent approximately twice the compressibility range of the draft gear **89**. As the shoe **137** extends downwardly from the plate **131***a*, the main plate support **130** is necessarily disposed at a level providing suitable support for the runner. For this purpose, the center sill **12** is extended downwardly by small channels **139** and **140** (see FIG. 12) welded to the undersides of the flanges **14**. The plate **130** is bolted to the undersides of the channels **139** and **140**.

Hence, by provision of the structure just described, the coupler **15** and the yoke **95** may be readily disconnected by unbolting and removing the lock plate **103** and thereupon removing the key **98**. After such disconnection, if removal of the yoke or draft gear is desired, the plate **130** is removed, providing access to the bolts which secure the runner **131** to the wall extensions **135** and **136** of the pod **18**. Removal of the runner then permits withdrawl of the yoke and draft gear assembly downwardly out of the pod **18**.

In the load supporting area, the bolster filler construction of this invention comprises a center pivot casting **108** which may be attached by welds **109** to the flange **110** of the body bolster **122**. The casting **108** fits between

lower edges of cleats **112** fastened to the opposite inner surfaces of the center sill by bolts or rivets. In accordance with an actual practice of the invention, the cleats **112** may constitute remnants of the standard center filler casting conventionally used in this portion of the center sill. The cleats center the member **22** with respect to the sides of the center sill. A filler plate **111** vertically positions the pivot casting **108** so that it will support the member **22** at a height within the sill **10** providing standard coupler height above the rail.

To avoid excessive bearing pressures of the member in sliding contact with the casting **108**, the member **22**, as to the portion thereof overlying the casting **108**, is provided with plates or shoes **113**, of which their undersurfaces are flush with the undersurfaces of the flanges of the member **22** to provide more bearing area of the member in sliding contact with the casting **108**. The shoes **113** are suitably reinforced by a plurality of ribs **114**. A standard car body center plate **116** is positioned underneath the filler plate **111** and bolted or riveted to the body bolster **122** and the center sill in the usual manner; such bolts or rivets extend also through the filler plate **111**.

By the construction just described, the center sill of conventional design is opened up to receive the draft column and to permit reciprocal movement thereof within the center sill **12** without any interference with a standard bolster pin **117**. The casting **108** comprises a sleeve **115** for receiving the pin **117** which replaces the sleeve of the standard center filler casting.

In the manufacturing of new cars, in accordance with this invention, the underframe of a railway car is preferably inverted so that the open underside of the fixed sill **12** faces upwardly. Assuming the guide plates **78** and the cleats **112** are installed within the center sill, the completed draft column **10** may be lowered into the sill **12**. The keys **36** and **36***a* are then inserted through the slots **30** and **30***a* and through the center sill bearing portions **39** and **39***a*. The draft column **10** is then shifted longitudinally of the center sill to align the web surfaces **34** and **34***a* with key surfaces **38** and **38***a*, respectively, to define the pocket **20** at the neutral position of the column **10**. The draft unit **40** is appropriately shortened to enter the pocket **20** and inserted thereinto under some initial compression by a spring **40***s* of the unit **40**. The circumference of this spring is shown in dotted line in FIG. 6. The support plate **56**, with the channel bar **66** welded thereto, is then bolted to the flange extensions **64**. The brackets **72** are then bolted to the flanges **14**. Thus, the column **10** is secured within the center sill **12** as to the central portion of the car.

A draft gear **89** for each end of the column **10** is inserted into its respective yoke **95** and each resulting assembly is lowered into its respective pod **18**. The shanks of respective couplers **15** are inserted into the end portions of the yokes to bring respective key-receiving slots into transverse registry and the keys **98** inserted into the slots. Each key **98** is secured in its operative position by the lock plate **103** as hereinbefore described. The runner **131** of each pod is bolted in its position as shown in FIGS. 8 and 9. Subsequently, the plate **130** is bolted to the sill **12**. The column **10** complete with draft gears, yokes and couplers is now in completely assembled condition and secured at the ends and the middle in reciprocable relation with the fixed sill; all that remains is to apply structure associated with the body bolsters adapted to receive the kingpins **117**.

At each body bolster the center pivot casting **108** may now be welded in place to the bolster flange **110** and the filler plate **111** positioned with the apertures therein in alignment with the apertures on the body center plate and in alignment with bolt holes in the flanges of the center sill. This assembly is then bolted or riveted together. Installation of the draft column **10** may further include the mounting of additional bridge brackets similar to brackets **72** at spaced intervals along the center sill **12** for additional stiffening of the center sill and support of the column **10**.

In operation, when the car is impacted from the left, as required for automatic coupling, a buffing force will be first transferred through the shank of the coupler **15** to the draft unit **89**. The gear **89** is of such limited capacity that movement of the coupler **15** relative to the column **10** will cease before there is any contact between the coupler horn **15***a* and the front striker face **85** of the column **10**. As the initial compression within the draft gear **89** becomes equal to the initial compression in the center gear **40**, the center gear and the column **10** will move rearwardly relative to the fixed sill. The webs **32**, through their bearing surfaces **34**, engage and tend to compress the center gear **40** abutting the key **36***a* in fixed relation with the sill **12**. The inertial forces developed by the car and lading weight, and acting on the gear **40** through the key **36***a*, are substantially minimized by cushioning action provided by the long travel hydraulic mechanism of the gear **40**. In being compressed, the abutment surface **48** of the draft gear reservoir **42** moves away from the key **36**. When the car is impacted from the right, the operation described above is similar but with the directions reversed.

When the cars are operated in trains, the buff and draft forces which are required to move the train are transmitted directly through the draft columns of the train without being transmitted through the car bodies as is the case with cars of standard construction. Because these forces by-pass the fixed sills of the cars and the associated car bodies and lading, the center gear is not ordinarily worked in normal train movements. However, when dynamic action among the cars of the train arising out of differences in relative speed between car bodies and respective draft columns, there may be low magnitude working of the center gear. This action is caused, e.g., by brake application or "run-in" and "run-out" of slack within the train.

FIG. 14 diagrammatically illustrates a further embodiment of the invention different from the heretofore described embodiment, primarily in the construction of the pod **145** and the draft gear **146** housed therein, and the connection of the coupler **15** with the pod **145**. The draft column **144** is constructed upon the principle that only one of the two end draft gears of the draft column need be operable in both buff and draft. The other end draft gear, i.e., the gear **146**, need be operable only in buff loading. As herein intended, the gear **146** is sufficiently durable to cushion all buff loading without the use of metal stops to limit travel for gear protection. Such an arrangement is rendered practicable because car and lading protection is derived primarily through the operation of the center gear **40**. The presence, at one end of the column only, of a draft gear capable of absorbing both buff and draft loads provides adequate protection of the draft column **144** against excessive buff and draft loads. The presence of a draft gear **146** at the other end of the column, operable in buff only, permits the coupler to be angled relative to the car end while engaged with a resilient means. If the gear **146** was not provided, then free slack between the coupler butt and the adjacent abutment would have to be provided to allow horizontal coupler angling. The presence of slack is objectionable.

Accordingly, this latter embodiment is characterized in part by provision in the side walls of pod **145** of key-receiving slots **147**, **148**. These slots are of sufficient length in the longitudinal direction of the column to permit movement of a key **146***a* in a direction toward the middle of the car relative to the column in accordance with the shortening of the gear **146** in absorbing buff loads applied through the shank of the coupler connected by the key **146***a* to the pod **145**. The side walls of the pod **145** provide shoulders, i.e., forward and rear

stops, for receiving the draft gear **146** in somewhat the same manner as found in the pods **18**. The front shoulders of this pocket may be eliminated and the forward stops of the draft gear realized in the forward end of the slots **147** and **148**, through the key **146***a* and the rear portion of the coupler shank. The pod **145** and draft gear **146** are of smaller, simpler and less expensive construction than their counterparts at the other end of the draft column **144** but are deemed to be entirely adequate and serviceable in combination with the long-travel center draft gear **40** and the draft gear **89**.

FIG. 16 is a transverse section in elevation through the axis of a vertically aligned shank pivot pin **150**, illustrating that yokes and couplers, of the type connected by a pivot pin which is aligned during normal operation along a vertical axis, may be utilized in the present invention. The illustration by FIG. 16 is typical of the connection of an A.A.R. standard type Y47 yoke with a standard type F coupler. That is to say, the pin **150** is positioned within bores therefor in the upper and lower end portions **151** and **152** of the yoke **153** and the bore provided in the shank **154** of the coupler. The yoke **153** and draft gear (not shown) encircled by the yoke are supported by the runner **131** in the same manner as the yoke **95** and draft gear **89** of FIG. 8. The shoe **137** of the runner slides over the upper surface of the plate **130** in the manner hereinbefore described with respect to the embodiment of FIGS. 1 to 13.

A useful structural feature of the pod **18** is that the tab-like lower projection **99** of wall **81***b* to which the lock plate **103** of the earlier embodiment is attached may be used in the embodiment of FIG. 16 as one support to which one down-turned side of a U-shaped plate **155** is attachable for retaining the pin **150** in its operative position connecting the coupler shank **154** and the yoke **153**. The pod wall **81***c* is extended as a tab **99***a*, similar to tab **99**, to which the other down-turned side of the plate **155** is attached. Connection of the retainer plate **155** to the wall extensions **99** and **99***a* is effected by bolts, such as the two bolts **100**. The plate **155** is of sufficient width in the longitudinal direction of the column to remain under the pin in all conditions of compression of the draft gear enclosed by the yoke. In the standard coupler arrangements, the diameter of the pin is approximately 3½ inches. Satisfactory support thereof is afforded by a retainer plate of 4 inches in width when centered under the pin at its neutral position.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention of excluding such equivalents of the invention described or of the portions thereof as fall within the purview of the claims.

What is claimed is:

1. A railway car underframe comprising: a pair of end sills; a plurality of cross members serially spaced between the end sills; a hollow center sill of uniform transverse cross section extending from one end sill to the other with said cross members and end sills extending laterally from both sides of the center sill in fixed attachment thereto; a draft and buff column of greater length than the center sill in longitudinally movable relation therewith; said column extending within the entire length of the center sill and comprising an intermediate elongate member and a pair of end pods, each pod attached to one of opposite ends of the member and defining a pocket for housing a cushioning gear and an associated coupler butt; each pod being generally complementary in external periphery to the internal periphery of the center sill and of larger transverse cross section than the member, and being attached to the member with opposite lateral surfaces of the pod in laterally outwardly offset relation with corresponding opposite lateral surfaces of the member to expose longitudinally inner end surfaces of the pod constituting stop shoulders at each side of the column facing toward the longitudinal center of the underframe; said member being thereby disposed within the center sill with a clearance between opposite lateral sides of the member and corresponding adjacent inner lateral surfaces of the center sill; a pair of stop cleats in longitudinally-facing opposing relation with the stop shoulders of each pod; each cleat being attached to one of said inner lateral surfaces of the sill within one of said clearances, and being positioned inwardly from an end of the sill in spaced relation with its corresponding opposed stop shoulder; said pairs of cleats being spaced to define a range of movement of the column relative to the sill; cushioning means housed centrally within the member and disposed operatively between the center sill and the column for cushioning impact loads between the column and the sill; the cushioning means comprising resilient means for urging the column to a neutral intermediate position within said range from any position therein at either side of said position; each pod, at said neutral position, extending into said sill a distance greater than the distance between the stop shoulders of the other pod and its corresponding opposing cleats.

2. The railway car underframe of claim 1 wherein: said member comprises an H-beam having the web thereof removed along an intermediate section to receive said cushioning means and the flanges thereof forming said opposite lateral surfaces.

3. The railway car underframe of claim 1 wherein: the center sill is of inverted U-shape cross section; the column has a downwardly-opening longitudinally central pocket in which said cushioning means is positioned; means supporting the cushioning means is secured between the lower extremities of the side walls of said central pocket and has an upwardly facing flat surface on which the cushioning means rests, a downwardly-facing flat surface spaced downwardly therefrom by reinforcing structure for centrally stiffening the column; said underframe includes means for supporting the column within the sill fixed to opposite sides of the sill and extends under said downwardly-facing surface in longitudinally slidable relation therewith; and said downwardly-facing surface longitudinally overlaps said means for supporting the column by approximately the length of said range.

4. The railway car underframe of claim 1 wherein: said beam comprises an H-beam having its flanges aligned vertically and its web horizontally within the center sill; said cross members include body bolsters transversely centrally aligned with portions of said H-beam which are open underneath the web, said H-beam portions being at least as long as said range of movement; and said underframe comprises a center plate mounted centrally under the intersection of each body bolster and the center sill for receiving a bolster pin with its axis in vertical alignment; and means superjacent the center plate for supporting the column within the center sill at a height maintaining the web out of engagement with the upper end of a bolster pin operatively positioned in the center plate.

5. The railway car underframe of claim 1 wherein: the center sill is of open-bottom construction for freight cars characterized by an internal width of 12⅞ inches and an internal height of $12\frac{15}{32}$ inches.

6. The railway car underframe of claim 5 wherein: a pair of cleats is supported by the center sill 38⅜ inches from each end of the sill, said dimension being measured from the end of the sill to the vertical faces of said pair of cleats facing toward the sill end.

7. The railway car underframe of claim 1 wherein: the center sill is of inverted U-shape cross section; said underframe includes means for supporting the column within the sill fixed to opposite sides thereof and extending underneath the sill from one side thereof to the other at longitudinally spaced points along the sill; said supporting means comprises a horizontal plate centered generally under the draft gear pocket of each of said pods

at said neutral position of the column, each plate having a length substantially that of said range of movement; a flat-bottomed runner rounded at each end and secured to the underside of each pod longitudinally centrally of said pocket thereof in sliding engagement with the upper surface of said plate.

8. The railway car underframe of claim 7 wherein: the beam has a downward-opening longitudinally-central pocket in which said cushioning means is positioned; means supporting the cushioning means is secured between the lower extremities of the side walls of said central pocket and has an upwardly-facing flat surface on which the cushioning means rests, and a downward-facing flat surface spaced downwardly therefrom by reinforcing structure for centrally stiffening the column; said underframe includes means for supporting the column within the sill fixed to opposite sides of the sill and extends under said downwardly-facing surface in longitudinally slidable relation therewith; and said downwardly-facing surface longitudinally overlaps said means for supporting the column by approximately the length of said range.

9. A railway car draft column of which all longitudinal portions are receivable into a railway freight car center sill, the column comprising: end pods for housing coupler-shank and cushioning-unit assemblies, at least one of the pods having front and rear stops and being arranged to accommodate an assembly comprising a coupler shank, yoke and a draft gear disposed within the yoke between said front and rear stops with a key connecting and extending transversely through the shank and the front head portion of the yoke; said pod being open along its underside from side wall to side wall, except for detachable means for supporting one of said assemblies, one of said side walls having a downward extension adapted to extend below said sill when the column is positioned therein; a lock plate for retaining said key in operative position detachably secured to said extension and extending into overlapping relation with a region occupied by one end surface of said key; said pod having an inner wall surface in enclosing adjacent relation to the region occupied by the other end surface of the key in its operative position.

10. The draft column of claim 9 wherein: a region within said one pod occupied by the key at its neutral position occurs along an axis that is horizontal at the normal position of the column; said one wall has an opening in horizontal alignment with said axis; said wall opening is large enough for longitudinal passage of the key therethrough; said wall has a downwardly facing pocket disposed along its inner surface above said opening; said lock plate being secured within the pocket by extending upwardly from attachment with said extension crosswise of the wall opening and into said pocket whereby said key is confined within the pod.

11. The draft column of claim 10 wherein: a region within said one pod occupied by the key at its neutral position occurs along an axis that is vertical at the normal position of the column; said lock plate having a vertical portion in attachment with said extension and another portion extending horizontally transversely therefrom into subjacent relation with the bottom end of said region for confining said key within the pod.

No references cited.