June 25, 1963 R. L. LICH 3,095,094

CUSHIONED UNDERFRAME

Filed May 23, 1960 3 Sheets-Sheet 1

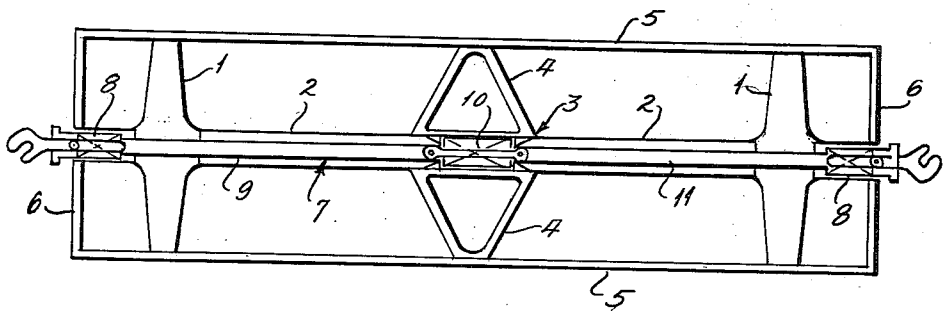


FIG.1

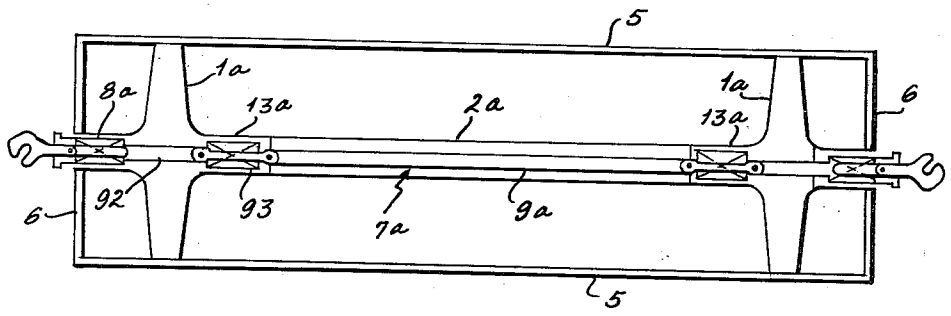


FIG.8

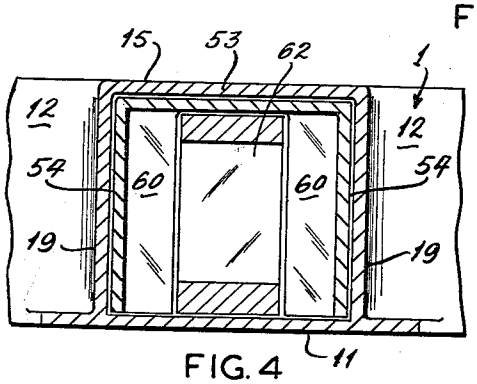


FIG. 4

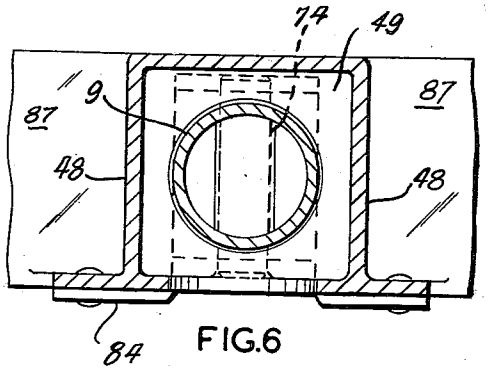


FIG.6

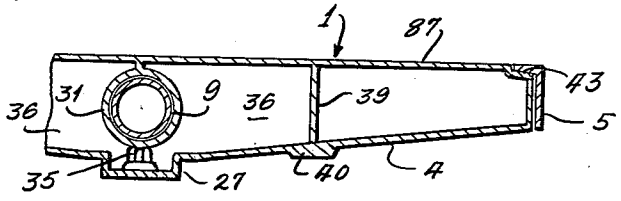


FIG.5

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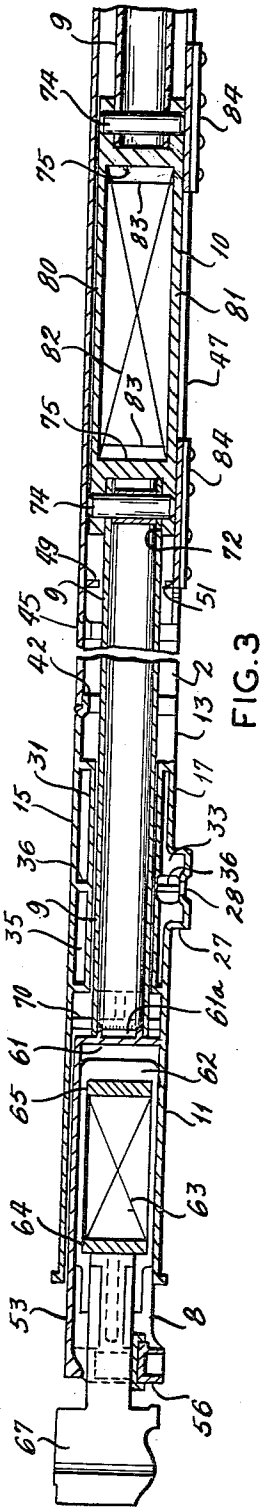


FIG. 3

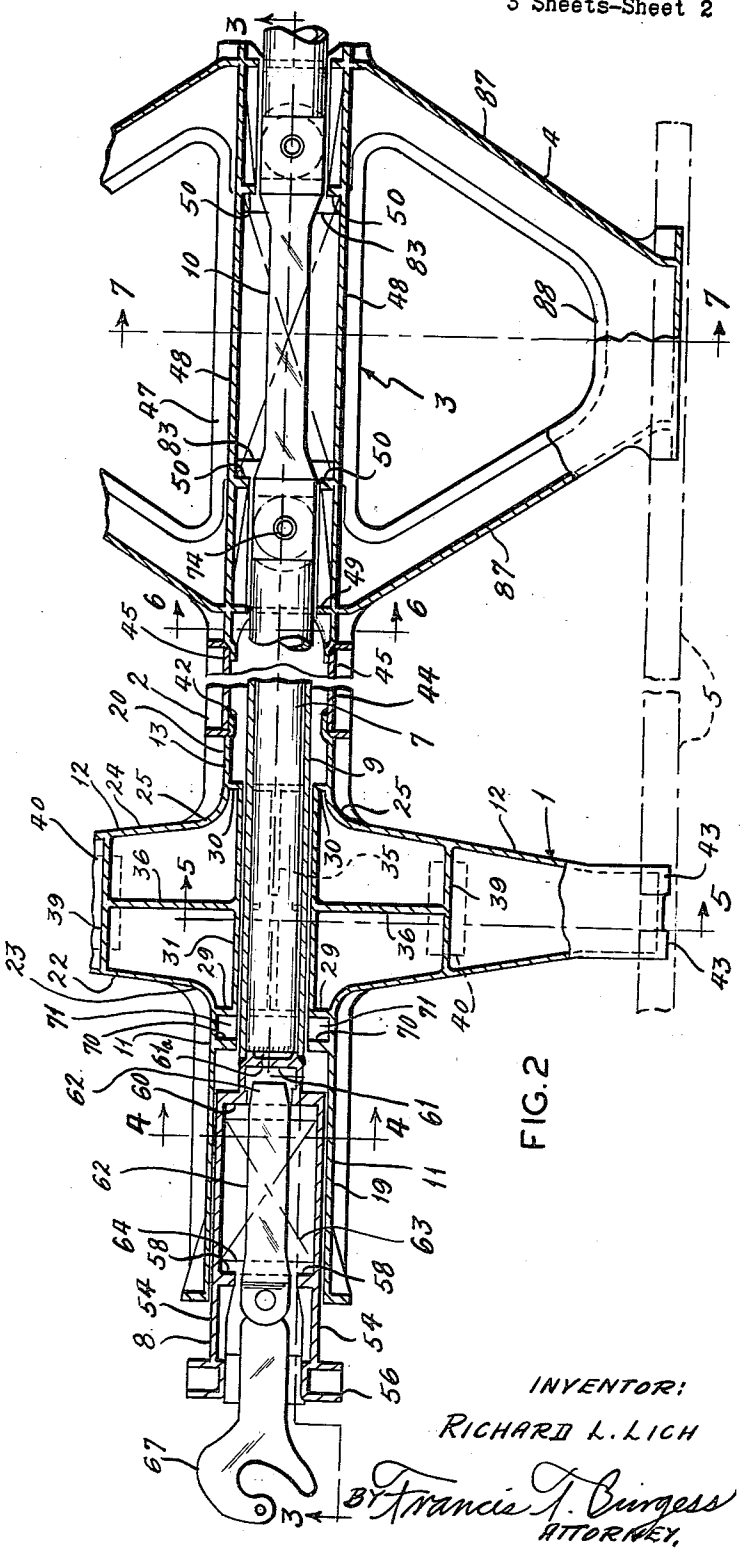


FIG. 2

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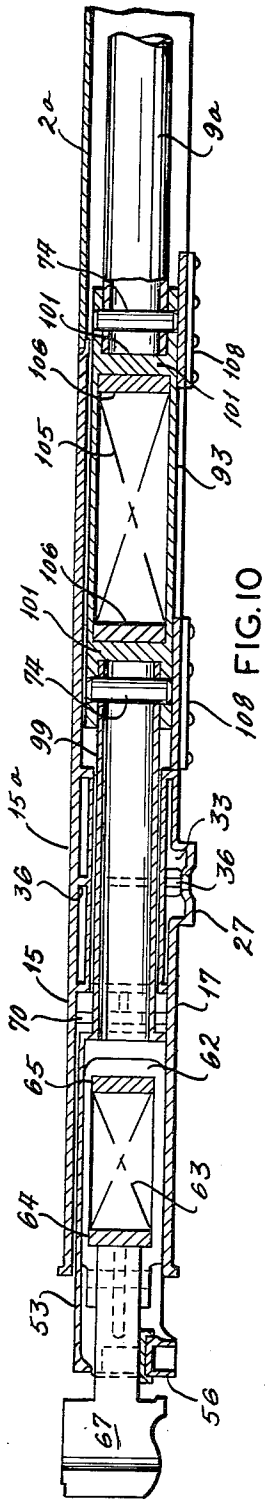


FIG. 10

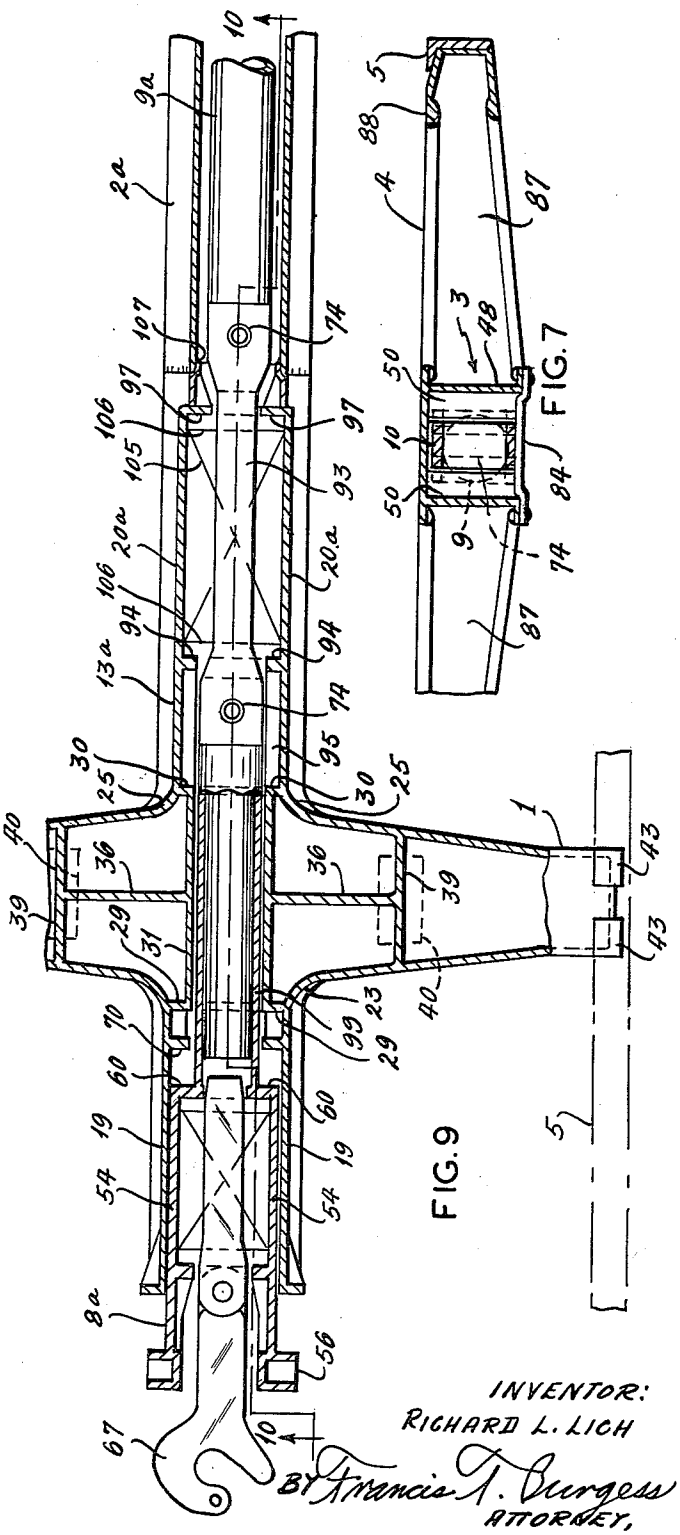


FIG. 9

FIG. 7

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CUSHIONED UNDERFRAME

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Filed May 23, 1960, Ser. No. 31,095
24 Claims. (Cl. 213—8)

The invention relates to cushioned underframes for railway cars and consists particularly in an underframe embodying a longitudinally movable draft and buffing column.

The advantages of cushioned underframes of the floating center sill or floating draft column type are well-known, their principal advantage being that greater cushioning, i.e., energy absorption, can be provided for the end shocks to which freight cars are subjected during coupling and train operation than can be provided where the sole cushioning is accomplished by movement of the couplers relative to the car underframe, even where long-travel draft gear is used, because with floating, or longitudinally movable, draft columns much greater movement of the couplers with relation to the car body is permitted without proportionately increasing movement of the couplers on the same car relative to each other, with consequent increase of the slack between cars. This is accomplished by providing relatively short travel of the couplers in relation to the draft column (and to each other) and much longer travel of the draft column with relation to the car body.

Cushioned underframes, whether of the movable sill or movable draft column type are considerably more complex than conventional underframes equipped solely with conventional draft gear and this increased complexity, with attendant increase in maintenance and difficulty of access to many of the wearing parts, has discouraged the greater use of these devices.

It accordingly is a main object of the invention to provide a floating draft column in which removal and replacement of wearing parts is facilitated.

It is a further object to provide a floating draft column type underframe in which the distribution of stresses resulting from the application of end shocks to the couplers is substantially improved over conventional cushioned underframe structures.

It is a further object to provide a cushioned underframe in which the draft column is slidably mounted within the center sill portion of underframe structure embodying improved transverse framing for better distributing the stresses resulting from end shocks, throughout the underframe structure.

The foregoing and additional objects and advantages as will appear from the following description are attained by the structures illustrated in the accompanying drawings in which:

FIGURE 1 is a schematic plan view of a car underframe embodying one form of the invention.

FIGURE 2 is a horizontal view of an end and intermediate portions of the underframe illustrated in FIGURE 1, with the top removed to better disclose its internal construction and operation.

FIGURE 3 is a longitudinal vertical sectional view along the line 3—3 of FIGURE 2.

FIGURES 4, 5, 6 and 7, respectively, are transverse vertical sectional views along the lines 4—4, 5—5, 6—6 and 7—7 of FIGURE 2.

FIGURE 8 is a schematic plan view of a car underframe embodying a second form of the invention.

FIGURE 9 is a horizontal view of an end portion of the underframe illustrated in FIGURE 8, with the top wall removed to better disclose its internal construction and operation.

FIGURE 10 is a longitudinal vertical sectional view along the line 10—10 of FIGURE 9.

Throughout the following description, the terms "forward" and "rear," "forwardly" and "rearwardly," etc., will refer to the location of elements relative to the nearer end of the car; i.e., the "forward" side of the bolster is that side of the bolster nearer the adjacent end of the car, and conversely, the "rear" side of the bolster is that side of the bolster remote from the adjacent end of the car.

Referring now to the drawings, the car underframe illustrated in FIGURE 1 comprises cast steel end structures with built up intermediate center sill portions 2 secured at their one ends to the rear portions of end structure 1 and at their other ends to a cast steel central structure 3 formed with laterally extending triangular projections 4. Side sills 5 are secured to the lateral extremities of end portions 1 and to the extremities of triangular sides 4 of central portion 3, and end sills 6 are supported on the longitudinally extending ends of end structures 1.

The longitudinal extending central portions of members 1, 2 and 3 are united to form a continuous hollow center sill, in which is slidably received, for movement lengthwise of the sill, a draft column 7 comprising separate elongated columnar structures each including a coupler pocket outer end section 8 and a tubular inner section 9, and a central yoke section 10 connecting the inner ends of the tubular inner sections 9.

As best seen in FIGURE 2, the end portions 1 are of cruciform shape in plan, comprising a box section center sill consisting of forward and rear sections 11 and 13, and bolster arms 12 extending laterally outwardly from center sill 11, 13, and forming the boundary between sections 11 and 13. Center sill portions 11 and 13 and bolster arms 12 are each of box section and are formed with common top and bottom walls 15 and 17. Center sill forward and rear sections each have vertical side walls 19, 19 and 20, 20, respectively. The bolster arms have forward side walls 22 which merge arcuately at 23 through curved wall portions of relatively large radii with center sill forward side walls 19, and the bolster rear walls 24 merge arcuately through curved wall portions 25 with center sill rear side walls 20. By merging the bolster arm and center sill side walls arcuately in this manner, the build-up of stresses at their intersections is minimized. At substantially the center of the intersection of bolster arms 12 and center sill sections 11, 13, the bottom wall 17 is formed with a depending cylindrical center plate 27 adapted to be pivotally received in and supported on the mating center plate of a supporting car truck (not shown).

Since under buffing and draft loads, the bolster arms collectively must function as a beam horizontally loaded at its center and with its reaction points at its ends, adjacent the points of tangency of curved wall portions 23 and 25 with sill side walls 19 and 20, the opposite sill side walls 19, 19 and 20, 20 are connected respectively by transverse vertical webs 29 and 30; each of these webs is circularly apertured and they are connected by an integral cylindrical wall 31 adapted to permit the insertion and travel therethrough of tubular portion 9 of movable draft column 7. For further rigidifying the structure, cylindrical wall 31 is connected to top wall 15 by a short vertical web 33 extending upwardly from the top of cylindrical wall 31, and to the bottom wall 17 by a pair of corresponding downwardly extending vertical webs 35 separated from each other adjacent the center pin hole 28 to permit the insertion of the center pin. For providing vertical rigidity of the bolster 11, 11, intermediate the forward and rear bolster side walls a vertical web 36 extends transversely of the structure and merges intermediate its ends with cylindrical wall 31 and vertical webs 33 and 35, and terminates in a merger at its outer ends with vertical web structures 39 extending transversely of the bols-

ter arms between forward and rear bolster arm side walls 22 and 24. Walls 39 overlie horizontal side bearing surfaces 40 which are formed on the bottom wall 17 of the bolster arms for engagement with opposing bearing surfaces on the truck bolster to limit transverse tilting movements of the car body relative to the truck. The ends of the bolster arms are suitably formed, as at 43, for supporting connection to side sills 5.

The top wall and rear side wall portions 20 of the sill are offset slightly downwardly and inwardly as at 42 to form a lap joint with the adjacent end of built-up center sill section 2 of conventional hat section formed by butt-welding the top flanges of two rolled Z's together. Built-up sill section 2 extends toward the center of the car and at its inner end is similarly connected, by means of a lap joint as at 45 to the adjacent end of the underframe cast steel central structure 3.

The center sill section 47 of member 3 is of hat-shaped cross-section corresponding to that of built-up member 44, and spaced inwardly from each of its ends, on its upright side walls 48, are formed pairs of inwardly-extending, transversely-spaced and aligned lugs 50, in transverse alignment with the ends of the draft gear opening in yoke 10. Lugs 50 define a pocket in center sill section 47 for receiving yoke 10 and a cushion member 82 and followers 83 carried therein, which will be described more fully hereinafter. For reinforcing center sill section 47 transversely, near each of its ends it is formed with a transverse vertical web 49, circularly apertured as at 51 to permit the passage therethrough of draft column tube 9.

Draft column 7 is longitudinally-slidably mounted in center sill 11, 13, 2, 47. The coupler and draft gear pocket end sections 8 of draft column 7 are of generally rectangular section having a top wall 53, side walls 54, 54, and no bottom wall. The outer end is formed with the usual coupler carrier 56, and spaced inwardly therefrom. Each of the side walls is formed with inwardly extending transversely-aligned forward draft lugs 58; the rear end of the draft gear pocket is formed by a pair of transversely-aligned inwardly extending walls 60 which are adapted to serve as rear draft lugs; between the inner margins of webs 60, a shallow rearwardly-extending recess, the full height of the draft pocket, is formed by vertical channel-shaped wall 61 and a rearward extension of top wall 53. A circular boss 61*a* on the rear surface of the transverse portion of wall 61 is inserted into and secured by welding to the end of draft column tubular section 9 which extends through the cylindrical opening 31 between sill transverse walls 29 and 30.

The usual coupler 67 is supported on carrier 56 and is secured to a conventional draft gear yoke 62, in which is mounted draft gear 63, which may be of conventional type, and yoke 62, draft gear 63, and the usual followers 64 and 65, are received in the draft gear pocket formed by forward draft lugs 58, rear transverse walls 60, top wall 53, and side walls 54, followers 64 and 65 being urged into abutting engagement with the forward draft lugs 58 and the rear draft lug-forming transverse walls 60 by compression of the draft gear, whereby a portion of the energy received by the coupler under buffing and draft conditions, and transmitted to the draft gear by the yoke, is dissipated.

With relation to the draft column, the coupler and its associated yoke 62 and draft gear 65 function in the same way that couplers and draft gear function in relation to conventional center sills, i.e., when a buffing force is applied to the coupler, as during a coupling operation, the coupler urges the yoke inwardly, thereby compressing the draft gear, with some of the energy being dissipated by the draft gear and the remainder transmitted through the rear draft follower 65 into the draft column by means of draft pocket rear walls 60. Rearward movement of the yoke 62 in the pocket is accommodated by the provision of the recess extending rearwardly from draft pocket rear walls 60. Draft forces are similarly cushioned and transmitted into the draft column by the compression of the draft gear 63 against forward follower 64 and thence into the column by means of forward draft lugs 58.

For limiting rearward sliding movement of the draft column within the sill, transversely-aligned inwardly-extending lugs 70 are formed on the rear surfaces of the center sill side walls 19, 19 and are spaced a short distance forwardly of forward transverse internal webs 29, being connected to webs 29 by one or more horizontal reenforcing webs 71, intermediate the sill top and bottom walls. When maximum permissible travel of the draft column is reached, stops 70 are adapted to engage the rear surfaces of draft pocket rear wall 60, and thus prevent further travel.

The rear end of tube 9 is removably received within a cylindrical socket 72 formed in the adjacent end portion of yoke 10, the socket forming end portion of yoke 10 and the end portion of tube 9 being formed with registering vertically-aligned apertures through which a pin 74 is removably inserted for maintaining the tube 9 and yoke 10 in assembled buff-and draft-transmitting relation. At this point it will be understood that the opposite end of yoke 10 is similarly formed and similarly connected to the other identical end portion of the draft column comprising a second tube 9, draft pocket end section 8, etc., as hereinabove described. Yoke 10 is, in general, similar to conventional draft gear yokes, i.e., it includes spaced end elements 75 and top and bottom elements 80 and 81, which together form the boundaries of an elongated rectangular opening in which a long travel cushion, or spring device, 82 is received between the usual followers 83, which are urged against the transversely aligned draft lugs 50 and yoke end portions 75 by the action of the cushion 82. The end portions of yoke 10 are supported in the sill and the pins 74 are retained in place by means of retainer and support plates 84 which extend between and are attached by rivets or other suitable means to the flanges of the sill forming structures. As is evident from the drawing (particularly FIG. 2), only limited clearance is provided between the exterior surfaces of draft pocket side walls 54 and center sill side walls 19, between draft column tubes 9 and sill cylindrical walls 31, and between tubes 9 and the periphery of circular aperture 51 and sill center section transverse webs 49, so that any forces tending to produce nonlongitudinal movement of draft column 7 will be resisted by slidable engagement of the longitudinally spaced parts enumerated above, thereby preventing substantial nonlongitudinal movements of the sections comprising the draft column.

From the foregoing, it will be seen that any buffing forces of sufficient magnitude to be transmitted through the draft gear 63 into the draft column 7 will cause movement of the draft column with respect to the sill structure, thereby compressing cushion 82, in the compression of which a substantial amount of the energy received by the draft column will be dissipated before being transmitted through the followers 83 and lugs 50 into the car underframe. Since the amount of travel permitted by the cushion 82 in no way affects the relative travel between the two couplers, a much greater travel can be tolerated than that permitted in the coupler draft gear 63, without the production of an intolerable amount of slack during train operation.

For distributing such stresses as may result from forces transmitted from cushion 82 to draft lugs 50 and thence to the sill, to other parts of the car framing, underframe central structure 3 is formed with a pair of truss-like members 4 of generally V-shape in plan extending laterally outwardly from center sill section 47 and each comprising a pair of diagonally-extending channel-section members 87 merging at their inner ends with the flanges and side walls of the sill section 47 in the region of draft lugs 50 and merging at their outer ends with each other through a short longitudinally-extending portion 88 of similar channel cross-section. The outer surfaces of portions 88 are

suitably finished to permit the application to them of the car side sills 5 so that some of the forces received from the cushion by underframe central structure 3 will be transmitted into the side sills and other parts of the car framing.

In many conventional cushioned underframes, the replacement of cushion devices is a major operation. In the present construction, this can be accomplished simply by removing the plates 84, which support the ends of the cushion yoke 81 and retain the connecting pins 74 in place, sliding the draft column end sections 8, 9 forwardly in the sill, and dropping the yoke 81, associated cushion 82, and followers 83 from the pocket in the sill central section 47. A new cushion may then be inserted in the yoke between the followers, and the yoke end cushion assembly then inserted in the cushion pocket of the sill; draft column end sections 8, 9 can then be slid rearwardly in the sill until their rear end portions are in proper registry with the ends 75 of yoke 81, pins 74 inserted, and plates 84 re-applied. Replacement of coupler draft gear 63 is similarly facilitated. By unpinning draft column end section 8, 9 from yoke 10, and withdrawing the column end section 8, 9 from the end of the sill, and disengaging coupler 67 from coupler yoke 62, yoke 62 may be dropped, the defective draft gear 63 removed, new draft gear inserted in the yoke, the yoke, draft gear, and followers being inserted into the draft gear pocket in draft column end section 8, couplers 67 being re-inserted into the pocket and re-assembled with the yoke, the assembled draft column end section 8, 9 being slid rearwardly in the sill into registry with the adjacent end of cushion yoke 10 and re-assembled therewith, as indicated above.

A second form of the invention is illustrated schematically in FIGURE 8, in which the same reference numbers will be used as in FIGURE 1 where applicable. In this form, the cast steel cruciform underframe end structures 1*a* differ from the end structure 1 of FIGURE 1 in that the portion 13*a* of the end structure center sill, extending rearwardly from the bolster arms, is elongated to form a pocket for a long-travel cushion device, the rear extremities of both underframe end structures 1*a* being connected by a continuous built-up sill 2*a*. The draft column is modified accordingly, draft pocket end portion 8*a* having an elongated tubular extension 92 removably fastened to a yoke 93 positioned within the pocket formed in elongated center sill portion 13*a*, the rear ends of each of the yokes 93 being connected by a tube 9*a* to form, with the end members 8*a*, and the yokes 93, a continuous draft column 7*a*.

This form of the invention is more fully disclosed in FIGURES 9 and 10, in which reference numerals corresponding to those in FIGURES 2 and 3 are used to denote corresponding parts, other parts being denoted by corresponding reference numerals followed by the letter *a*, or by different numerals. In FIGURES 9 and 10, the underframe end structure 1*a* is identical to that shown in FIGURES 2 and 3 forwardly of curved wall portions 25.

The rear center sill section 13*a* of the end structure 1*a* has vertical side walls 20*a*, 20*a* with inwardly-extending transversely forward cushion lugs 94 formed on their rear surfaces a short distance rearwardly of the bolster arms, there being one or more horizontal re-enforcing webs 95 extending forwardly of lugs 94 and merging at their forward ends with internal transverse vertical webs 30. Near the rear end of sill section 13*a*, rear draft lugs 97 are formed on the rear surfaces of sill side walls 20*a*, the sill side walls being offset a slight distance inwardly at this point to permit registry with a fabricated sill structure 2*a* of somewhat smaller cross-section than the sill portion of the end casting. The ends of side walls 20*a* are offset inwardly and the top wall 15*a* is correspondingly offset downwardly as at 107 to form a lap joint with the adjacent end of built-up sill section 2*a*.

Draft pocket end portion 8*a* of column 7*a* is similar to the corresponding portion 8 shown in FIGURES 2 and 3, except that it is provided with an integral cylindrical extension 99 which passes through the cylindrical wall structure 31 across the bolster intersection, its rear end portion being received within a cylindrical recess formed within the adjacent forward end 101 of yoke 93, vertically aligned portions of the interfitting ends of extension 99 and yoke 93 being provided with vertically registering apertures through which pins 74 are passed to secure the members to each other. The rear end of yoke 93 is similar to the forward end and is similarly connected to tube 9*a*. Yoke 93 mounts a long travel cushion 105 and the usual followers 106, which are normally in abutting engagement with draft lugs 94 and 97, whereby any movements imparted to the draft column from either end, in either direction, cause compression of cushion 105 and are partly cushioned thereby. The ends of yoke 93 are supported by plates 108 removably secured to the lower surfaces of the sill flanges; these plates also serve as retainers for pins 74 whereby the yoke 93 is secured to the cylindrical extension of draft pocket end portion 8*a* and tube 9*a*. It will be understood that tube 9*a* is similarly secured at its opposite end to an identical yoke 93 which in turn is similarly secured to a cylindrical extension 99 of an identical draft pocket end section 8*a*, to form the continuous draft column 7*a*, the latter yoke and draft pocket end portion 8*a* being received within the other identical underframe end structure 1*a*.

Operation of the second form of the invention is substantially the same as that of the first form. When the magnitude of buffing or draft forces applied to the coupler exceeds the energy adsorption capacity of draft gear 63, the excess energy is transmitted through either of the draft followers 64 or 65 and the associated draft lugs 58 or 60 into the draft column end structure 8*a*, 99 and thence through cushion yoke 93 and tube 9*a* into remote cushion yoke 93, and through both the cushion yokes 93 and followers 106 into cushions 105, in which much of the excess energy is dissipated by the travel of the associated yokes and draft column as accommodated by the resiliency of the cushions. As in the first form of the invention, the only relative movement permitted between the couplers 67 is that accommodated by the relatively short travel of the draft gears 63 so that during train operation slack will be limited to the extent of this movement. Without affecting the amount of slack, a substantially greater amount of cushioning movement is permitted between the couplers and the associated car underframe than is permitted between the opposite couplers on the same car, by the use of long travel cushions 105 between the longitudinally rigid draft column 7*a* and the car underframe. By locating these cushions in cushion pockets formed within the cast steel end structures 1*a*, closely adjacent the bolster arms 12, which are designed for maximum rigidity transversely of the car, proper distribution is insured, transversely of the underframe, of stresses resulting from forces applied by cushion followers 106 to the forward and rear cushion lugs 94 and 97, respectively. In this embodiment of the invention, as well as in the first form, removal and replacement of the cushions is facilitated, requiring only the removal of yoke support and pin retainer plates 108, removing pins 74, sliding draft column end sections 8*a*, 99 forwardly, dropping yoke 93, removing the defective cushion 105 from the yoke, positioning a new cushion in the yoke and re-inserting the yoke, and cushion and followers in the sill, and re-assembling the draft column in the reverse order of disassembly. Replacement of the draft gear 63 is similarly facilitated. By unpinning draft column end section 8*a*, 99 from yoke 93, and withdrawing the column end section 8*a*, 99 from the end of sill and disengaging coupler 67 from coupler yoke 62, yoke 62 may be dropped, the defective draft gear 63 removed, new draft gear inserted in the yoke, the yoke, draft gear and followers being inserted into the draft gear pocket, coupler 67 being reinserted into the pocket and reassembled with

the yoke, the assembled draft column end section 8a, 99 being slid rearwardly in the sill into registry with the forward end of cushion 93 and reassembled therewith as indicated above.

The structural features of the invention may be varied otherwise than as shown without departing from the spirit of the invention, and the exclusive use of those modifications as come within the scope of the appended claims is contemplated.

What is claimed is:

1. A cushioned underframe comprising a hollow longitudinally-extending center sill and a draft column longitudinally-slidably received therein and adapted to mount coupling devices at its ends, longitudinally-spaced lugs carried by said sill and forming a pocket therein, said column including a yoke and separate elongated columnar structures removably secured to the ends of said yoke, said yoke being positioned within said pocket with its ends aligned tranversely of said sill with said lugs, and a cushion device in said yoke with its ends normally engaging the ends of said yoke and said lugs whereby energy imparted to said column by the application thereto of buffing and draft forces is adsorbed, said sill including surfaces slidably engageable with each of said columnar structures at points spaced apart longitudinally of the sill and preventing substantial other than longitudinal movements of said columnar structures relative to said sill.

2. A cushioned underframe comprising a hollow longitudinally-extending center sill and a draft column longitudinally-slidably received therein and including at its ends coupler and draft gear pockets each adapted to receive couplers and associated draft gears, longitudinally-spaced lugs carried by said sill and forming a pocket therein, said column including a yoke and separate elongated columnar structures removably secured to the ends of said yoke, said yoke being positioned within said pocket with its ends aligned transversely of said sill with said lugs, and a cushion device carried by said yoke with its ends normally in abutting relation with the ends of said yoke and said lugs, said sill including surfaces slidably engageable with each of said columnar structures at points spaced apart longitudinally of the sill and preventing substantial other than longitudinal movements of said columnar structures relative to said sill.

3. A cushioned underframe comprising a hollow longitudinally-extending center sill and a draft column longitudinally-slidably received therein, said draft column comprising separate elongated end sections each formed at their extremities with coupler and draft gear pockets and tubular extensions extending longitudinally inwardly therefrom, and a yoke removably secured at its ends to the inner ends of each said tubular extension and forming with said end sections a continuous rigid draft column, lugs formed on said sill in alignment transversely thereof with the ends of said yoke, and a cushion device mounted in said yoke with its ends in abutting relation with the ends of said yoke and said lugs whereby to absorb the energy received by said column from buffing and draft forces imparted thereto, said sill including surfaces slidably engageable with each of said end sections at points spaced apart longitudinally thereof and preventing substantial other than longitudinal movements of said end sections relative to said sill.

4. A cushioned underframe comprising a hollow longitudinally-extending center sill and a pair of aligned bolster arms extending transversely of said sill and spaced longitudinally from each end thereof, a draft column longitudinally-slidably received within said sill and comprising separate elongated end section each formed longitudinally outwardly of said bolster arms with coupler and draft gear pockets and tubular extensions extending longitudinally inwardly past said bolster arms, said sill including surfaces slidably engageable with each of said end sections at points spaced apart longitudinally thereof and preventing substantial other than longitudinal movements of said end sections relative to said sill, yokes removably secured at one end to the inner ends of each said tubular extension and spaced longitudinally from each other, a columnar member removably secured at its extremities of the inner ends of said yokes and forming with said end sections and said yokes a continuous rigid draft column, lugs formed on said sill in alignment transversely thereof with the ends of said yokes, and cushion devices mounted in said yokes with theid ends in abutting relation with the ends of said yokes and said lugs whereby to absorb the energy received by said column from buffing and draft forces imparted thereto and causing longitudinal movement thereof.

5. A cushioned underframe comprising end structures each having a longitudinally-extending center still portion and a pair of aligned transversely-extending bolster arms at each end, transverse wall structure within said sill connecting said aligned bolster arms, a central section having a longitudinally-extending center sill portion and laterally-extending truss portions, longitudinally-extending center sill sections each rigidly secured at its opposite ends to one of said end sections and to the adjacent end of said central section whereby to form with the center sill portions of said end sections and said central section a rigid longitudinally-extending center sill, a draft column longitudinally-slidably received within said center sill and comprising separate elongated end sections each formed longitudinally outwardly of said bolster arms with coupler and draft gear pockets of enlarged cross section and having a rearward longitudinal extension of reduced cross section passing through said transverse wall structure, said sill having surfaces slidably engageable with each of said draft column end sections at points spaced apart lengthwise of the sill and preventing substantial other than longitudinal movement of said draft column end sections relative to said sill, and a yoke removably secured at its ends to the inner ends of each said column end section and forming with said column end sections a continuous rigid draft column, said yoke being received within the center sill portion of said underframe central section, lugs formed on the center sill portion of said central section in alignment transversely thereof with the ends of said yoke, and a cushion device mounted in said yoke with its ends in abutting relation with the ends of said yoke and said lugs whereby to absorb the energy received by said column from buffing and draft forces imparted thereto.

6. A cushioned underframe comprising end structures each having a longitudinally-extending center sill portion and a pair of aligned transversely-extending bolster arms at each end, transverse wall structure within said sill connecting said aligned bolster arms, a longitudinally-extending center sill section rigidly secured at its opposite ends to each of said end sections whereby to form with said end sections a continuous rigid center sill, a draft column longitudinally-slidably received within said center sill and comprising separate elongated end sections each formed longitudinally outwardly of said bolster arms with coupler and draft gear pockets of enlarged cross section and having a rearward longitudinal extension of reduced cross section passing through said transverse wall structure, said sill having surfaces slidably engageable with each of said draft column end sections at points spaced apart lengthwise of the sill and preventing substantial other than longitudinal movement of said draft column end sections relative to said sill, and yokes each removably secured at their outer ends to the inner end of one of said column end sections, a columnar member extending between and removably secured at its opposite ends to the inner ends of said yokes and forming with said column end sections and said yokes a continuous rigid draft column, said yokes being received within the center sill portions of said underframe end sections longitudinally inwardly of said bolster arms, lugs formed on the center sill portions of said un-

derframe end sections in alignment transversely thereof with the ends of said yoke, and cushion devices mounted in said yokes with their ends in abutting relation with the ends of said yokes and said aligned lugs whereby to absorb the energy received by said column from buffing and draft forces imparted thereto and causing longitudinal movement thereof.

7. A railway car cushioned underframe structure including end sections comprising a center sill portion and transversely-extending aligned bolster arms intermediate the ends thereof, said sill portion and said bolster arms being generally of box cross-section with common top and bottom walls and the adjacent sill and bolster arm side walls arcuately merging with each other, vertical webs extending transversely of said sill between the side walls thereof both forwardly and rearwardly of the intersections therewith of the bolster arm side walls, said vertical webs being centrally apertured, cylindrical wall structure in registry with said apertures and connecting said transverse vertical webs to permit the passage therethrough of a cylindrical draft column structure, vertical web structure extending longitudinally of the underframe and connecting the top and bottom of said cylindrical wall structure with said top and bottom walls and extending between and merging at its ends with said forward and rear transverse vertical webs, and an additional transverse vertical web intermediate the forward and rear bolster walls and extending across said sill and terminating at both sides thereof laterally outwardly of the arcuate connections between said sill and said bolster arm side walls.

8. A railway car cushioned underframe structure according to claim 7 in which said end section center sill portion terminates immediately rearwardly of its intersection with said bolster arms, there being a separate additional center sill section extending longitudinally of the underframe and rigidly secured at its ends to the center sill portions of said end structures.

9. A railway car cushioned underframe structure according to claim 8 in which said intermediate center sill structure includes a central section formed with a pair of longitudinally-spaced pairs of transversely-aligned lugs, said lugs forming with the sill walls a cushion pocket in said sill, and laterally-extending truss members rigid with said sill portion with their outer extremities in longitudinal alignment with the outer extremities of said bolster arms for providing a mounting for underframe side sills and distributing stresses received by said lugs to said side sills.

10. A railway car cushioned underframe structure according to claim 7 in which the center sill portion of said end section is elongated rearwardly of said bolster arms and is formed with a pair of longitudinally-spaced pairs of transversely-aligned lugs on the inner surfaces of its side walls to form with side walls a pocket for a cushion device, the outer extremities of said bolster arms being formed to receive underframe side sills whereby stresses received by said lugs are distributed in part to the side sills.

11. A railway car draft column adapted to be slidably received within a railway car center sill and comprising separate elongated end members adapted to mount a coupling device and to engage surfaces on the sill at points spaced apart longitudinally thereof and an intermediate yoke member adapted to receive a cushion device, said end members and said yoke member being removably secured to each other in buff- and draft-transmitting relation.

12. A railway car draft column adapted to be slidably received within a railway car center sill and comprising separate elongated draft gear and coupler pocket forming end members with tubular rearward extensions, said end members being adapted to engage surfaces on the sill at points spaced apart lengthwise thereof and an intermediate yoke member adapted to receive a cushion device, said tubular extensions and said yoke member being removably secured to each other in buff- and draft-transmitting relation.

13. A railway car draft column according to claim 12, in which the ends of said yoke member are formed with cylindrical sockets receiving ends of said tubular extensions, there being aligned apertures through the ends of said yoke member and the portions of said extensions received therein, and a removable member passing through said aligned apertures and maintaining said extensions and said yoke member in the desired buff- and draft-transmitting relation.

14. A railway car draft column adapted to be slidably received within a railway car center sill and comprising separate elongated draft gear and coupler pocket forming end members with tubular rearward extensions, said end members being adapted to engage surfaces on the sill at points spaced apart lengthwise thereof, longitudinally-spaced intermediate yoke members each adapted to receive a cushion device and each removably secured at its one end to the tubular extension of an adjacent end member, and a tubular member extending between and removably secured at its ends to the other ends of said yoke members.

15. A railway car draft column according to claim 14, in which both ends of each of said yoke members are formed with cylindrical sockets, one of said sockets of each yoke member receiving the tubular extension of the adjacent column end member and the other socket of each yoke member receiving an end of said tubular member, there being aligned apertures extending substantially transversely of the axis of the column through the ends of said yoke members and the ends of said extensions and said tubular member, respectively, received therein, and removable members passing through said aligned apertures and normally maintaining said end members, said yoke members, and said tubular member in the desired buff- and draft-transmitting relation.

16. An end section for a railway car cushioned underframe, comprising a center sill portion and transversely-extending aligned bolster arms intermediate the ends thereof, said sill portion and said bolster arms being generally of box cross-section with adjacent sill and bolster arm side walls arcuately merging with each other, and common top and bottom walls, vertical webs extending transversely of said sill between the side walls thereof both forwardly and rearwardly of the intersections therewith of the bolster arm side walls, said vertical webs being centrally apertured, cylindrical wall structure merging at its ends with both said vertical webs in registery with said apertures to permit the passage therethrough of a cylindrical draft column structure, vertical web structure extending longitudinally of the underframe and connecting the top and bottom of said cylindrical wall structure with said top and bottom walls and extending between and merging at its ends with said forward and rear transverse vertical webs, and an additional transverse vertical web intermediate the forward and rear bolster walls and extending across said sill and terminating at both sides thereof laterally outwardly of the arcuate connections between said sill and said bolster arm side walls.

17. An end section for a railway car cushioned underframe according to claim 16 in which downwardly facing horizontal side bearing surfaces are formed on the bottom walls of said bolster arms laterally outwardly of said sill, said additional transverse vertical web terminating over said side bearing surfaces.

18. An end section for a railway car cushioned underframe according to claim 16 in which said center sill portion terminates immediately rearwardly of its intersection with said bolster arms and is there formed for attachment to the end of a separate center sill section.

19. An end section for a railway car cushioned underframe according to claim 16 in which the center sill por-

tion is elongated rearwardly of said bolster arms and is formed with pairs of longtudinally-spaced transversely-aligned lugs on the inner surfaces of its side walls to form with said side walls a pocket for a cushion device, the outer extremities of said bolster arms being formed to receive underframe side sills whereby stresses received by said lugs are distributed in part to the side sills, the rear end of the rearwardly-elongated section of said center sill being formed for attachment to a separate sill section.

20. An intermediate section for a railway car cushioned underframe comprising a longitudinally-extending center sill portion having spaced vertical side walls and a horizontal top wall, said side walls being formed with a pair of longitudinally-spaced pairs of transversely aligned lugs on their inner surfaces, said lugs forming with the sill walls a pocket for a cushion device, and substantially horizontal truss members extending laterally in both directions from said sill side walls the full width of the car, said truss members being substantially of V-shape in plan with their legs rigidly attached to said sill in the regions of said draft lugs and their apices formed to receive a car side sill.

21. A railway car underframe structure comprising an elongated center sill and two pairs of transversely extending aligned bolster arms intersecting said sill and spaced lengthwise of the sill from each other and each spaced from an opposite end of said sill, said sill and bolster arms being generally of hollow rectangular cross section, with common top and bottom walls in the region of their intersections and the adjacent sill and bolster arm side walls arcuately merging with each other, vertical webs extending transversely of said sill between the side walls thereof adjacent the arcuate mergers of the sill and bolster arm sidewalls, said vertical webs being centrally apertured, tubular wall structure registering with said apertures and extending between adjacent transverse vertical webs, vertical web structures extending longitudinally of the underframe and connecting the top and bottom of said tubular wall structure with said top and bottom walls and extending between and merging at its ends with adjacent transverse vertical webs, an additional transverse vertical web intermediate adjacent bolster arm side walls and extending across said sill and terminating at both sides thereof laterally outwardly of the arcuate mergers between said sill and bolster arm side walls, a pair of longitudinally spaced pairs of transversely-aligned

inwardly directed lugs formed on said sill side walls intermediate said spaced pairs of bolster arms and forming a cushion pocket between them, a draft column longitudinally slidably received within said sill and comprising separate end sections of rectangular cross section positioned in the spaces between said bolster arms and the adjacent end of the sill and slidably engageable with inner surfaces of the sill and each having a tubular rearward extension of smaller cross section than said rectangular sections passing through the adjacent apertures and slidably engageable with the connecting tubular wall structure, and columnar structure intermediate said bolster arms and aligned with said end portions and detachably secured at its ends to the inner ends of said tubular extensions, said intermediate structure including a yoke with its ends normally transversely aligned with said lugs, there being a cushion device within said yoke with its ends normally engaging the ends of said yoke and said lugs whereby energy imparted to said column by the application thereto of buffing and draft forces is dissipated.

22. Structure according to claim 21 in which there are two of said pockets, one of said pockets being in the region of the sill adjacent each pair of aligned bolster arms.

23. Structure according to claim 21 in which there is a single pocket in said sill substantially at the center thereof.

24. Structure according to claim 23 in which substantially horizontal truss members extend laterally in both directions from the sill side walls the full width of the car, said truss members being substantially of V-shape in plan with their legs rigidly attached to said sill in the regions of said draft lugs and their apices formed to receive a car side sill.

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