Dec. 17, 1935. W. H. MUSSEY ET AL 2,024,868

BALANCED DRAFT GEAR

Filed May 25, 1931 2 Sheets-Sheet 1

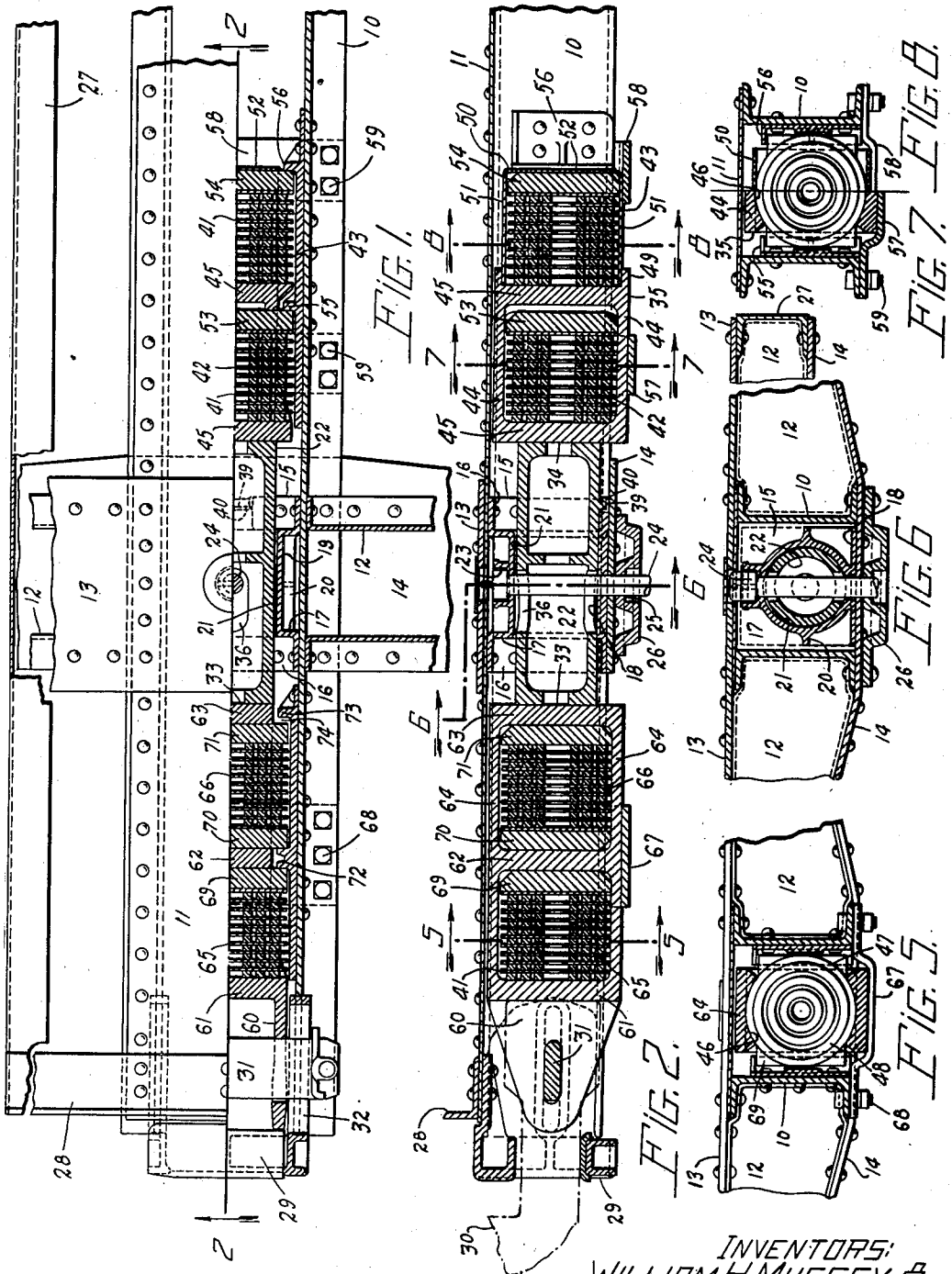


FIG. 1.

FIG. 2.

FIG. 8.

FIG. 6.

FIG. 5.

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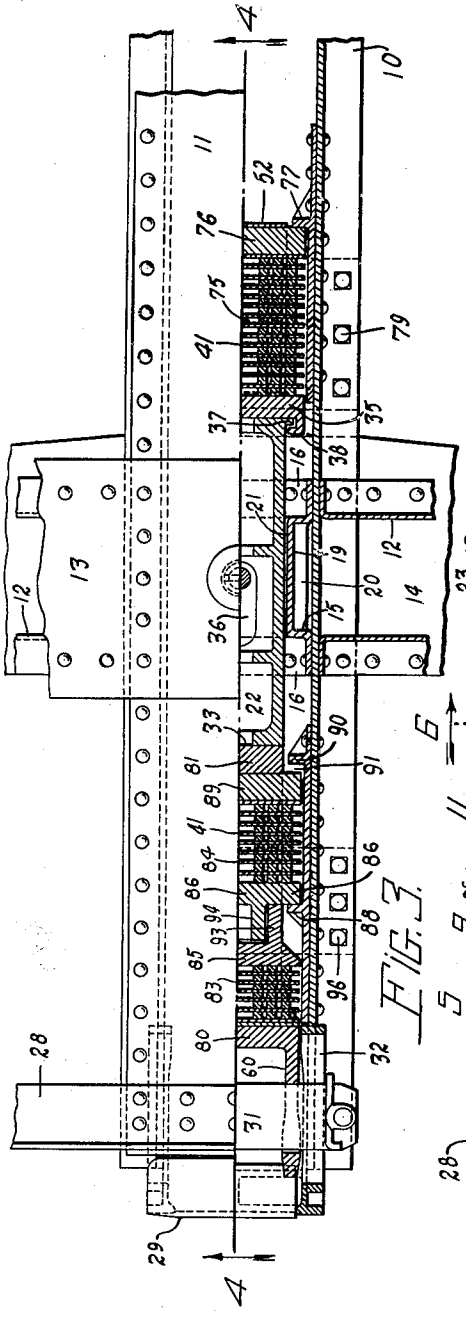


FIG. 3.

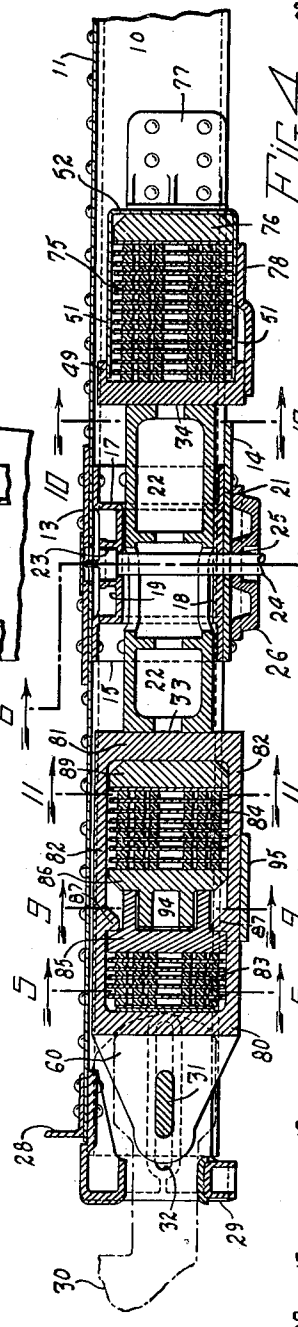


FIG. 4.

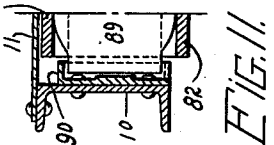


FIG. 11.

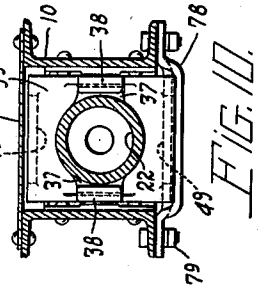


FIG. 10.

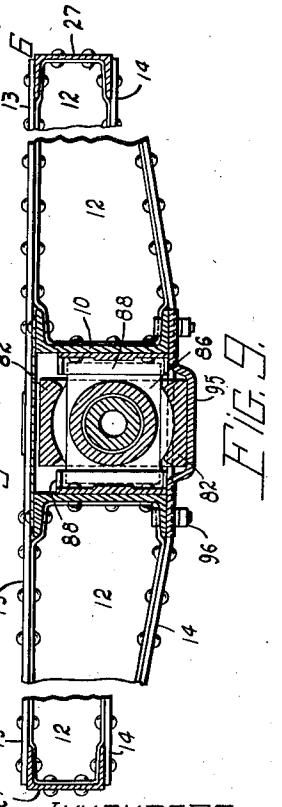


FIG. 9.

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UNITED STATES PATENT OFFICE

2,024,868

BALANCED DRAFT GEAR

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Application May 25, 1931, Serial No. 539,728

2 Claims. (Cl. 213—7)

The invention relates to draft and buffing gears for railway cars designed to substantially equalize the application of buffing stresses to the center sill upon opposite sides of the respective bolsters, whereby the sill under shock is stabilized about the center pin and the concentration of buffing forces upon the center sill between bolsters and adjacent car ends, is prevented.

The invention further contemplates the division of forces applied to the center sill at one bolster position between the two bolsters of the car underframe, whereby the forces transmitted to the side sill or car side by the first bolster will be neutralized by the second bolster, thereby materially reducing the weight or section of the side sill or car side required to withstand a given load.

The invention further proposes the use of rubber spring units in the draft gear assembled in groups designed to operate in parallel, and so arranged that all of the spring groups will function to resist buffing and one or two, but less than all of them, will be utilized in draft operations.

The invention has for its further object the provision of means in one embodiment of the invention whereby the normal series of spring units of one or more of the several spring groups may be automatically broken up in draft operations for utilizing less than all of the spring units of the series in the spring group or groups selected for that purpose and permit all of the spring units of the series comprising the groups affected, to be used in buffing operations only.

The foregoing and other objects and advantages are achieved by the mechanism illustrated in the accompanying drawings, in which—

Fig. 1 is a plan view in partial horizontal section showing one embodiment of the gear;

Fig. 2 is a vertical longitudinal section through the gear taken on line 2—2, Fig. 1, showing the spring groups mounted between the spacer barrel and the respective follower stops on the center sill;

Figs. 3 and 4 show respectively similar views of another and preferred embodiment of the invention, Fig. 4 being a section taken on line 4—4, of Fig. 3;

Figs. 5, 6, 7, and 8, are vertical transverse sectional views through the gear and center sill, taken respectively on lines 5—5, 6—6, 7—7, and 8—8, of Figs. 2, and lines 5—5, and 6—6, of Fig. 4;

Fig. 9 is a vertical transverse sectional view taken on line 9—9, of Fig. 4, showing the draft yoke and the telescoping follower cylinders;

Fig. 10 is a similar view taken on line 10—10, of Fig. 4, showing one form of means for preventing forward movement of the spacer barrel under draft; and

Fig. 11 is a similar half sectional view taken on line 11—11, of Fig. 4, showing the type of follower plate used, and the relation thereof to the stops.

In draft gears heretofore generally employed, all of the gear parts have been positioned in the space between the bolsters and adjacent car ends whereby all of the blows delivered by the coupler were concentrated upon the adjacent portions of the center sills. Since the center of draft is usually found below the neutral axis of the center sills supporting the gear, the resultant eccentric loading of the sills causes a vertical displacement of the sills downwardly between bolsters and adjacent car ends, and upwardly between the bolsters of the underframe.

The eccentric loading is especially marked in the center sill at the bolster structure in which the neutral axis is stepped up by the presence of the relatively large mass of material entering into the construction of the bolster at the center sill position, resulting in abnormal stressing of the truck springs occasioned by the downward thrust of the center sill under buffing operations. Such upward thrust of the sill between the bolsters is communicated to the lading in the car with resultant shifting thereof from simultaneous car movement under impact.

Under frames thus equipped with draft gears mounted between bolsters and adjacent car ends only, transmitted the full stress of buffing to adjacent bolster and the center sill, whereby an undue proportion of such load was transmitted by such bolster to the side sills or car side. The difficulties enumerated are overcome by the placement of substantial portions of the gears at each end of the car upon opposite sides of respectively adjacent bolsters, to the end that the forces of buffing transmitted to the bolsters will be reduced by an amount corresponding substantially to the capacity of the respective gear parts between the bolsters.

Thus distributed, the forces generated are split up over a longer distance along the center sill, the effective column between the nearest gear part at one end of the car and the bolster at the opposite end being substantially shorter than that hitherto obtaining between such bolster and the gear positioned between the other

bolster and adjacent car end, since that portion of the center sill between the gear parts upon opposite sides of the respective bolsters is subjected only to shocks incident to the stressing of the gear parts nearest the couplers and quite independently of the loads imposed upon the center sill at the gear parts farthest removed from said couplers.

This substantially equalizes the stresses of buffing between the bolsters at opposite ends of the car, permitting a lighter construction of underframe with a corresponding reduction in cost of materials and without impairing the strength of the structure. Such disposition of the gear parts and distribution of buffing at isolated points on the center sill, promotes stability in the structure by overcoming the tendency of the sill to fulcrum vertically about the truck centers and admits of the use of center sills having areas well below the American Railway Association minimum requirement of 28 square inches for the section.

As indicated in the drawings, 10 represents the center sill with its members spaced apart and connected by a cover plate 11 and extending from end to end of the car. The bolster structure is built up around the sill and comprises preferably a plurality of diaphragms 12 spaced apart upon opposite sides of the center sill and connected at their inner ends to the webs of adjacent sill members and at their respective upper and lower margins by top and bottom cover plates 13 and 14 extending across the sills, as shown in Figs. 1 to 6, and 9.

The relation between the sill members and bolster cover plates is further maintained by a filler casting 15 of substantially box section and secured to sill and cover plates by means of circumscribing flanges 16 on walls 17 of the casting, as best shown in Figs. 1 to 4. The walls of the casting are connected by a base wall portion 18 resting upon bottom cover plate 14, as shown in Figs. 2, 4 and 6, and a cylindric web portion 19 immediately above the base plate and reinforced by radial flanges 20 extending between and further connecting the walls and cylinder, as illustrated in Figs. 1, 3 and 6. The cylindric wall 19 provides a bearing 21 for a spacing barrel 22 slidable therein for a purpose hereinafter to be described, and functions to stiffen the bolster and sill assembly. The upper side of the cylinder 19 is formed with a perforated socket 23 designed to receive the head and shank of a center pin 24 extending downwardly through corresponding openings 25 in the filler base 18, bolster bottom cover plate 14, and the center bearing 26.

As the bolster, sill and draft gear assemblies at the opposite ends of the car are identical, but one end assembly has been shown and but one described, the effect of the operation of one assembly upon the other being obvious. The bolsters are connected at their ends by side sill members 27 extending preferably to the end sills 28 and by them connected to the center sill to insure rectilinear stability between longitudinal and transverse members of the underframe whereby stresses of buffing may be distributed as contemplated from one bolster and draft gear assembly to the other. The center sill is fitted at its opposite ends with coupler carriers 29 for supporting drawbars 30 movably held by draft keys 31 slidably mounted in slots 32 in the center sill.

The draft mechanism of the invention is mounted between the sill members 10 and fore and aft of the bolsters, the gear divisions upon opposite sides of the respective bolsters being separated by spacer barrel 22 conforming in general outline to bearing 21 defined by the cylindric wall portion 19 of the bolster filler casting 15 above noted. The spacer barrel is formed at its ends with buffing faces 33 and 34 designed for engagement with respectively adjacent gear yokes in front of and rearwardly of the bolsters, and is provided with registered slots 36 extending longitudinally of the casting in its upper and lower peripheral sides to receive the center pin 24.

The barrel is held from rotation about its longitudinal axis and relative displacement prevented by the interlocking engagement of flanges 37 on the spacer barrel and the rebent flanges 38 on adjacent rear yoke member 35, as best shown in Figs. 3 and 10, the spacer barrel being thus restrained from encroachment upon the center pin 24.

The same result is obtained in another and perhaps more economical fashion by the device illustrated in Figs. 1 and 2, wherein the barrel 22 is provided with a lug 39 projecting downwardly from its underside and designed to engage one or more sides of notch 40 in base flange 16 on the filler 15, the lug and notch being held normally interlocked under pressure of spring units 41 of spring groups 42 and 43 in the rear yoke. As indicated in Figs. 1, 2, 7 and 8, the rear yoke is formed with its spaced arm portions 44 and end wall portions 45 integral to provide a housing for the series of spring units 41 comprising group 42.

The yoke arms 44 are proportioned to withstand pressure under buffing shocks and formed with their opposing faces grooved as shown at 46 to accommodate and retain circular rubber spring units 41 of the type illustrated in Figs. 1 to 5 inclusive, 7 and 8, comprising the core plate portions 47 and concentric rubber rings 48, the springs being entered in the yoke at a point adjacent the rear end wall 45 through a passageway formed by enlarging the opening between the yoke arms 44 adjacent the rear wall 45.

The rear yoke is further provided with rearwardly extending lug portions 49 to which is secured an auxiliary housing portion 50 comprising a plate section bent U-shape with a pair of arms 51 secured at their free ends to respectively adjacent lugs 49 on adjacent yoke wall 45, and their opposite ends connected by a rear wall portion 52, and forming a support for the second spring group 43, as best shown in Figs. 1, 2, and 8.

The spring groups 42 and 43 are held normally in compression respectively between follower 53 and yoke front wall 45 and between follower 54 and rear wall 45 of the rear yoke, the respective followers having bearing against stops 55 and 56 on the center sill 10, as best shown in Figs. 1, 2, 7 and 8, and since pressure during buffing is transmitted through the rear yoke and not at all by housing 50, the latter may be only of sufficient strength to carry the springs and follower enclosed by it. The rear yoke and attached spring housing 50 are operably supported respectively between the sill members by supporting plates 57 and 58 removably secured to underside of the sill by bolts 59.

It has been determined that the eccentricity

of the buffing load caused vertical displacement of the sill about the bolster whereby that portion of the sill in front of the bolster would droop and that behind the bolster thrust upwardly. When a portion of the buffing load is eccentrically applied to the sill at the draft stops 55 and 56 back of the bolster as shown in Figs. 1 and 2, these stops in effect, mark the ends of sill columns extending thence in opposite directions, the end of the shorter column to adjacent bolster tending to rise and the contiguous end of the longer column to opposite bolster tending to droop under buffing impact whereupon the forces are neutralized with the result that the sill columns are stabilized under shock and the car lading and truck springs freed of objectionable stressing, as before noted.

The gear mechanism of the same embodiment includes a front yoke member having forwardly projecting spaced ear pieces 60 slotted to receive draft keys 31 and forming integral parts of a yoke body comprising front, intermediate, and rear wall portions 61, 62, and 63, respectively, connected by arm portions 64, and together providing housings for spring group 65 and draft spring group 66. The yoke is slidably supported upon plate 67 removably secured to underside of center sill 10 by bolts 68. Since the yoke transmits the force of buffing to spacing barrel 22 in the bolster, the arms 64, as in the case of the rear yoke arms 44, are shaped to provide maximum section of material in the arms with portions adjacent intermediate and end walls 62 and 63 removed to receive spring units 41 of respective spring groups 65 and 66 and associated followers 69, 70 and 71. Followers 69 and 70 normally engage draft stops 72 and follower 71 will be normally free from adjacent draft stops 73 on the center sill for a purpose hereinafter outlined. The springs of these groups like those of groups 42 and 43 are held normally compressed within their respective housings.

The spring group 66 alone will function in draft but is adapted to combine with the other spring groups of the series during buffing operations, the remaining spring groups 42, 43 and 65, being inoperative in draft, during which period the front spring group 65 is shifted bodily and without distortion with the yoke walls 61 and 62, and follower 69, moving forward with the coupler 30. On the other hand, the second spring group 66 will be compressed between follower 70 held by draft stops 72 and companion follower 71 and rear wall 63 movable forwardly with the yoke.

The second spring group 66 has been chosen for draft purposes primarily for the reason that its position provides a longer radius for the draft arm with a relatively small angularity for a given lateral movement of the coupler at the carrier 29. Conceivably, the front spring group 65 can be made the draft spring group of the gear by the simple expedient of positioning a follower and draft stop adjacent the front wall 61 of the yoke but such arrangement would bring the swiveling point of the drawbar too close to the coupler carrier 29 and result in objectionable angularities of the drawbar for the required lateral movement.

In buffing operation, the front spring group 65 will be compressed between follower 69 held by draft stop 72 and the advancing front wall 61 of the yoke. To insure smooth transition of operation from draft to buffing stages or vice versa, during the normal lag and surge of coupled cars in train movement, the draft spring group 66 is initially compressed an amount approximating that of the remaining spring groups combined. It becomes necessary then to permit such other spring groups to be severally compressed an amount substantially equal to the compression of the draft spring before follower 71 engages the draft stops 73, the time interval thus required to equalize the compression in all of the springs being afforded by space 74 to permit the building up of the desired compression so that all of the springs will function uniformly in buffing.

During the initial stage of this operation, the second or draft spring group 66 will be shifted bodily with adjacent followers 70 and 71 for a distance corresponding to space 74 between follower 71 and adjacent draft stop 73. In the preferred embodiment shown in Figs. 3, 4, 9 and 11, the number of spring groups upon opposite sides of the bolster has been reduced but the groups themselves have been enlarged to seven spring units each to approximate the capacity of the four spring groups of five spring units each and to permit correspondingly greater gear movement during buffing. The rear yoke comprises the head 35 having upper and lower rearwardly projecting lug portions 49 to which is secured a housing portion comprising a plate section bent U-shape as in the case of the other embodiment and provided with a pair of arms 51 secured at their free ends to respectively adjacent lugs 49 and connected by a rear wall portion 52, and forming a support for the rear spring group 75. During buffing operations the springs are compressed between head 35 of the yoke and follower 76 normally engaging adjacent draft stops 77 on center sill 10. The yoke is slidably supported on plate 78 removably secured to underside of center sill by bolts 79, as best shown in Figs. 3, 4 and 10.

Buffing shocks are transmitted to the spring group 75 behind the bolster by a coupler yoke member formed with forwardly projecting spaced ear pieces 60 slotted to receive draft keys 31 and forming integral parts of a yoke body comprising front and rear wall portions 80 and 81, respectively, connected by arm portions 82, and together providing a housing for associated spring groups 83 and 84, the latter of which constitutes the draft spring in the assembly. The groups 83 and 84 are spaced by a pair of followers 85 and 86 normally engaging each other and the respective spring groups 83 and 84, to permit the functional union of said spring groups in buffing operations and their separation in draft.

The spring group 83 is held normally compressed between front wall 80 of the yoke and follower 85 bearing against stop lugs 87 on yoke arms 82, and draft spring group 84 under relatively higher compression between draft stops 88 on the center sill 10 and follower 89 bearing against rear wall 81 of the yoke and normally free of adjacent draft stops 90 on the center sill. The space 91 between draft stop 90 and adjacent follower 89 is designed to permit the building up of compression in front spring group 83 and the rear spring group 75 to approximate that of draft spring group 84 and for the reasons outlined above in connection with a similar arrangement for draft spring group 66 of the other embodiment.

In draft operations the forward movement of coupler **30** will carry with it the yoke with front spring group **83** and associated follower **85** urged by stop lugs **87** on the yoke and without distortion of that group, but draft spring group **84** will be compressed between follower **86** held against draft stops **88** and companion follower **89** urged by rear wall **81** of the yoke. As in the case of the draft spring group of the other embodiment, draft group **84** only will function in draft operations, and all of them will function to resist buffing shocks.

To insure working alinement of followers **85** and **86**, their opposing faces are formed with circular flanges **93** and **94**, respectively, functioning telescopically under draft movements, as shown in said figures, the flanges **94** of smaller diameter being relatively shorter than companion flange **93** of larger diameter to engage adjacent face of follower **86** to obtain the benefit of the relatively large area of that section in buffing.

For the purpose of slidably supporting the front yoke and contained spring groups a plate **95** is removably secured to the underside by bolts **96**, as best shown in Figs. 3, 4 and 9.

It will be noted that the spring groups in front of the bolster of the preferred form function in series on buff with respect to each other as though the spring units comprising them were in a single group, and both in parallel with the spring group **75** back of the bolster, to the end that the gear parts distributed back and front of the bolsters will function to stabilize the buffing stresses in the center sill at the bolster position as before outlined with respect to the other embodiment.

What we claim is:—

1. The combination with a car underframe including a bolster and a pair of center sills, of a draft gear comprising springs spaced longitudinally between the center sills and upon opposite sides of said bolster, and an intermediate transmitting member slidably supported within and projecting normally rearwardly of the bolster for engagement with said rear springs, and projections on said member engageable with said bolster for restraining forward movement thereof under thrust of the rear springs during draft operations.

2. The combination with a car underframe including a bolster and a pair of center sills, of a draft gear comprising springs spaced longitudinally between the center sills and upon opposite sides of said bolster, and an intermediate transmitting member slidably mounted within and projecting normally rearwardly of the bolster, and restraining means on said member and bolster for preventing displacement of said transmitting member under thrust of the rear springs during draft operations.

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