

July 16, 1940.

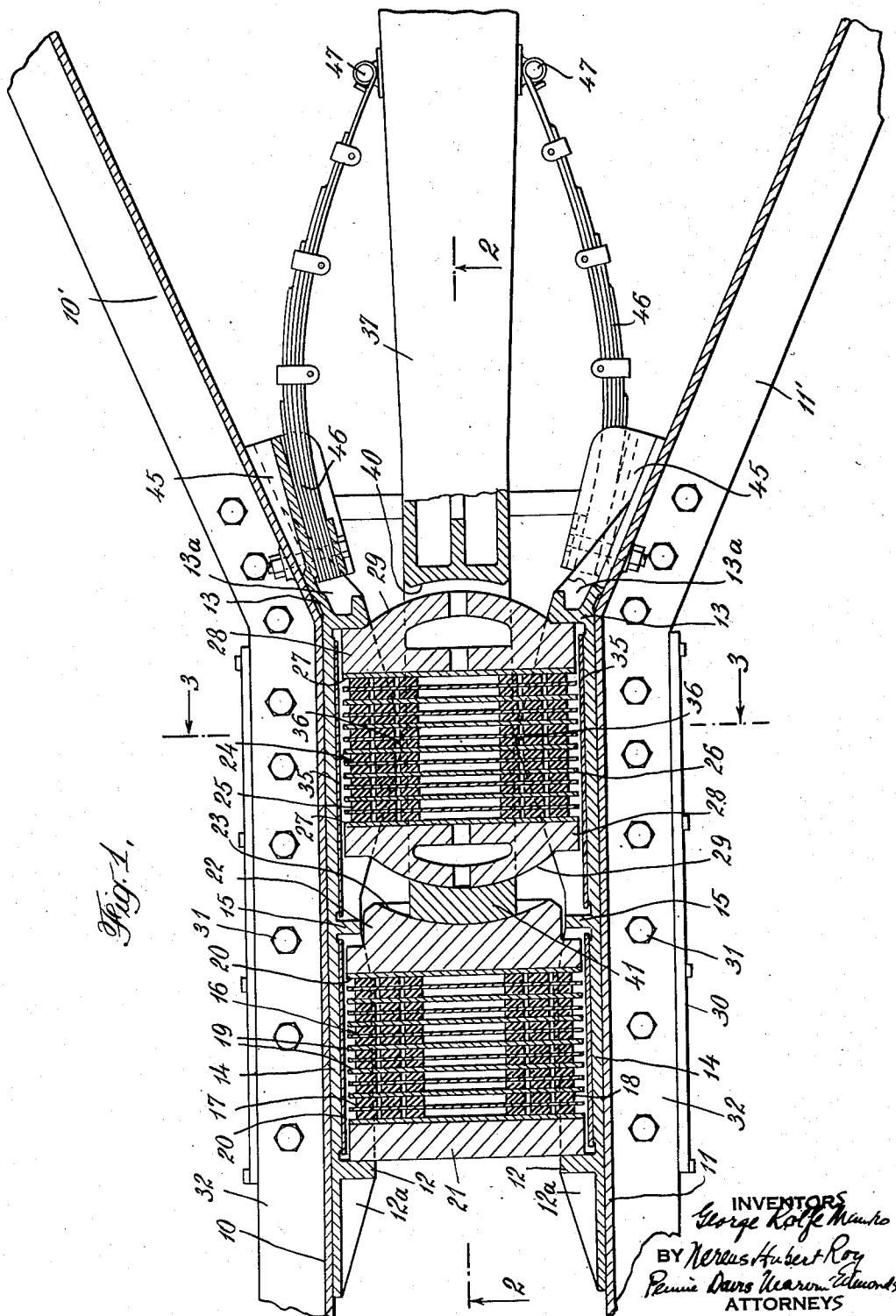
G. R. MUNRO ET AL

2,208,338

CUSHIONING MECHANISM

Filed April 4, 1940

2 Sheets-Sheet 1



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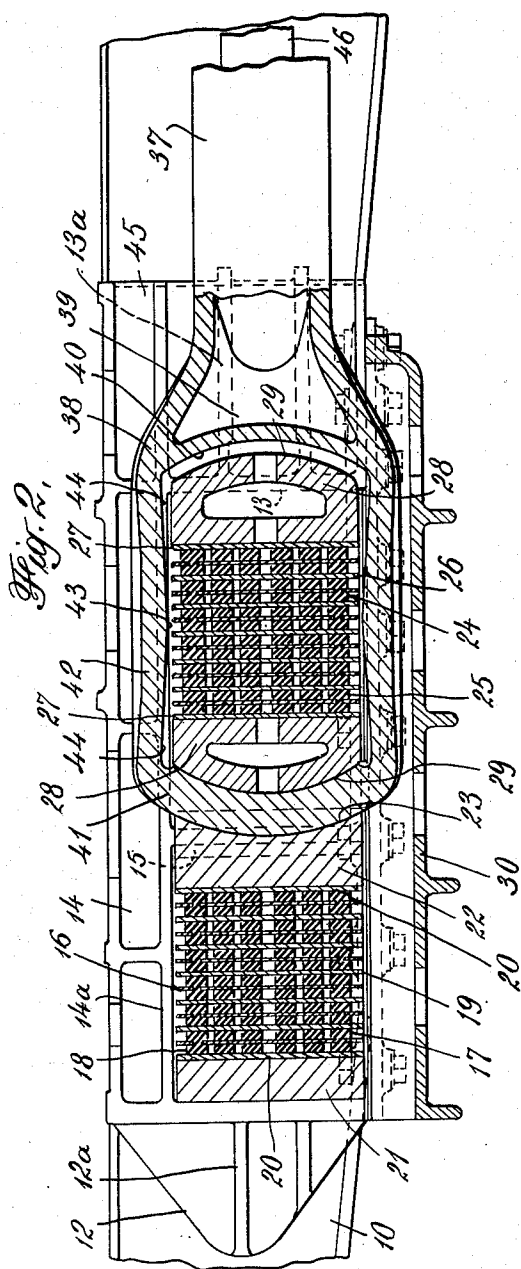
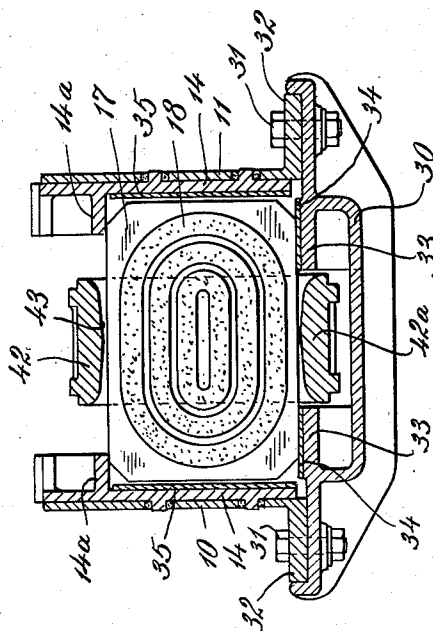
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Filed April 4, 1940

2 Sheets-Sheet 2



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2,208,338

CUSHIONING MECHANISM

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Application April 4, 1940, Serial No. 327,814

3 Claims. (Cl. 213—46)

This invention has to do with draft gears for use primarily on railway rolling stock, such as cars or motive power units, and is concerned more particularly with a novel draft gear which permits universal movement of the yoke associated therewith and may, accordingly, be used advantageously with a yoke formed integrally with the shank of its coupler. The new gear is superior to prior gears of the type referred to in that it provides an improved cushioning action and may be so constructed and installed that, under normal running conditions, it prevents the development in substantial or objectionable amount of free slack between the coupler and vehicle structure.

The new gear comprises a pair of cushioning units mounted in line longitudinally of the vehicle with one end of each unit normally engaging a fixed abutment on the vehicle structure and the other end contacting with a portion of the yoke. The units operate in alternation to cushion and resist movements of the coupler and yoke produced by forces in buff and draft, and the engaging portions of the units and yoke are so formed that the yoke and the coupler secured thereto may have universal movement. Also, the units are preferably installed between the yoke and abutment means under such effective compression that the expansivity of each unit during movements of the coupler and yoke against the resistance of the other unit is not substantially less, under normal running conditions, than the amplitude of such movements. Under the conditions mentioned, the units, when thus installed, make substantially continuous contact with the yoke and abutment means, so that free slack is eliminated and the transmission to the vehicle structure of dynamic forces producing shocks and jars and resulting from sudden reversals in the direction of application of forces to the coupler is prevented.

For a better understanding of the invention, reference may be made to the accompanying drawings, in which:

Fig. 1 is a view partly in plan and partly in horizontal section of one form of embodiment of the invention; and

Figs. 2 and 3 are sectional views on the lines 2—2 and 3—3, respectively, of Fig. 1.

In the construction illustrated in the drawings, the vehicle structure is provided with longitudinal sills 10 and 11 which may be conventional Z-bars, the forward ends of the sills diverging, as indicated at 10', 11'. These sills are provided with spaced draft stops 12 and 13, the stops 13 lying

at the points where the sills begin to diverge. The draft stops which are preferably reinforced by webs 12^a, 13^a, may be formed integrally with cheek plates 14 secured in any convenient manner to the inner faces of the sills, and extending inwardly from the cheek plates between the end stops 12 and 13 are intermediate stops 15.

The draft gear of the invention comprises a rear cushioning unit, generally designated 16, which lies between the sills and between the stops 12 and 15. This unit comprises a plurality of cushioning elements 17, which may conveniently take the form of metal plates provided on opposite faces with concentric rubber rings 18 of flattened oval form, the rings on opposite faces of a plate being connected together by plugs of rubber which pass through openings through the plate. Between adjacent cushioning elements are plain metal separator plates 19, and similar plain plates 20 may be installed at each end of the unit to protect the exposed surfaces of the rubber masses. Beyond the plates 20 are follower blocks 21, 22, the block 21 lying against the stops 12. The block 22 has a portion of greater width than the distance between the inner ends of the stops 15 and a central portion which extends through the space between those stops. The forward face of the central portion of the block 22 is spherically concaved, as indicated at 23.

Between stops 13 and 15 is another cushioning unit, generally designated 24 and made up of a number of rubber-bearing cushioning elements 25 and separator plates 26. At the ends of the unit are plain plates 27 contacting with the inner faces of follower blocks 28. The blocks 28 are cored castings having flat inner faces and outer faces which are centrally of spherical convexity, as indicated at 29. The outer edges of the front block 28 normally lie in contact with stops 13.

The cushioning units are supported on a carrier member 30 which is secured as by bolts 31 to the lower horizontal flanges 32 of the sills 10 and 11. The carrier member is provided with inward extensions 33 on which are mounted wear plates 34 on which the lower edges of the cushioning units rest, and similar wear plates 35 may be interposed between the vertical side edges of the units and the inner faces of the cheek plates 14. The inner edges of the extensions 33 lie substantially parallel throughout the length of the rear cushioning unit 16, but beneath the forward cushioning unit 24, the extensions are provided with opposed triangular projections 36

which lie approximately centrally of that unit. Overhanging the upper edges of the units are inward extensions 14^a on the cheek plates 14.

The coupler (not shown) is provided with a shank 37 with which a yoke 38 is integrally formed, the coupler shank resting on the usual transverse member (not shown) extending between the sills. The yoke encircles the front cushioning unit 24 only and its forward end member 39 is provided with an inner face 40 which is spherically concaved. The rear end member 41 of the yoke has similar faces of spherical formation, the inner face being concave so that it makes a good contact with the spherical convex surface of the follower 29 and the outer face of the end member 41 being spherically convex so as to make good contact with the concave face 23 of follower 22. The distance between the end members 40 and 41 of the yoke is somewhat greater than the overall length of the front cushioning unit including the followers 28, so that the inner face of the front end member of the yoke normally lies out of contact with the spherical face of the front follower 28. The longitudinal members 42 of the yoke have inner faces 43 which fall away laterally from the longitudinal median plane and the faces also fall away from the median transverse plane, as indicated at 44.

Attached to the inner surfaces of the flared portions 10', 11' of the sills are members 45 in which are seated and secured the ends of leaf spring groups 46, the outer ends of which are secured by bolts 47 to the lateral surfaces of the shank 37. The springs serve to centralize the coupler shank.

With the construction described, upon the application of a force in buff to the coupler, the coupler and yoke move rearwardly against the resistance of the rear unit 16, all of the force being transmitted from the yoke to the unit through the rear end member 41 of the yoke. Preferably, the units are installed under a high effective compression which is of such magnitude that each unit, under normal running conditions, has an expansivity not substantially less than the amplitude of movement of the coupler and yoke against the resistance of the other unit. When so installed, the application of the coupler of a force, for example in buff, of such magnitude as is developed under normal running conditions, moves the coupler rearwardly and compresses the rear unit 16 and coincidentally, the forward unit 24 expands and continues to contact with the rear end member of the yoke. When the force in buff changes to one in draft, the forward movement of the coupler is resisted by the front unit and since the rear follower of that unit has remained in contact with the rear end member of the yoke, the unit at once interposes resistance to the forward movement of the yoke. As the forward movement of the yoke is taking place, the rear unit is expanding so that its front follower continues to contact with the outer face of the rear end member of the yoke. Accordingly, under the conditions described, substantially all movements of the coupler and yoke are cushioned and there is never any free slack between the coupler and car structure.

By giving the opposed faces of the followers 22 and 28 the spherical form described and correspondingly shaping the inner and outer faces of the rear end member of the yoke, the yoke and coupler may have a universal movement relative to the cushioning mechanism and this is neces-

sary when the yoke and coupler shank are of rigid or integral form, particularly in the case of tight-lock couplers. The lower longitudinal member 42^a of the yoke lies between the inner end surfaces of the extensions 33 of the carrier member 30, but these extensions do not interfere with the movements of the yoke and the central portions 36 of the extensions assist in centralizing the yoke.

In operation under normal conditions, the adjacent follower blocks 22 and 28 of the two units never make contact with the intermediate stop 15 and the front end member 39 of the yoke never contacts with the adjacent follower block 29. The intermediate stops provide a convenient means for installing the rear unit under the desired effective compression, the parts of the unit being assembled beneath the space between stops 12 and 15, then compressed, and raised into position. Upon the release of the compressive force, the unit expands until its followers engage stops 12 and 15 and the unit remains in this position until the yoke with the forward unit in place therein is installed. In this operation, the forward unit is compressed against the rear end member of the yoke, until its forward follower 28 may be moved up behind the forward stops 13. When the yoke is in position and the compressive force released, the expansion of the front unit forces the forward end of the rear unit away from the intermediate stops, and the rear unit does not thereafter contact with those stops under normal conditions of operation.

In order to achieve the desired result of avoiding the development of free slack in substantial or objectionable amount between the coupler and vehicle structure, a high effective compression is applied to the units and the amount such compression depends on the amount and from of the rubber masses used therein. In a typical construction for installation on standard rolling stock, the cushioning elements are plates 12 $\frac{3}{4}$ " wide and 9" high, with each plate carrying three concentric rings of rubber on each face. The rings are $\frac{1}{8}$ " thick and have faces varying in width from 1" to 1 $\frac{1}{8}$ ". The spacing between the rings varies from $\frac{1}{8}$ " to $\frac{1}{2}$ " and the rubber is a compound containing various usual ingredients. Six such cushioning elements are employed in each unit and the units are installed between the front and rear stops and yoke under a total pressure of 7000 pounds. Under normal running conditions, the expansivity of the units so installed is such as to avoid the development of free slack in substantial or objectionable amount between the coupler and vehicle structure.

We claim:

1. In a vehicle, the combination of a pair of cushioning units lying in line lengthwise of the vehicle, abutments on the vehicle structure engaged by the remote ends of the units, a yoke encircling the outer unit only and having a portion movable therewith which lies between and contacts with the adjacent ends of the units, and a coupler having a shank connected to the yoke, the units operating in alternation to provide the sole resistance to movements of the coupler and yoke produced by forces in buff and draft applied to the coupler and being installed under such effective compression that, under normal running conditions, each unit has an expansivity not substantially less than the amplitude of the movements of the coupler and yoke against the resistance of the other unit, the contacting

portions of the adjacent ends of the units and of said portion of the yoke being of substantially spherical formation permitting universal movement of the yoke relative to the units.

- 5 2. In a vehicle, the combination of a pair of cushioning units lying in line lengthwise of the vehicle, the units having follower blocks at their ends, stops on the vehicle structure engaged by the blocks at the remote ends of the units, a
10 yoke encircling the outer unit only and having an end member lying between and in contact with the blocks at the adjacent ends of the units, said last named blocks and the faces of said end member being of substantially spherical forma-
15 tion permitting universal movement of the yoke relative to the units, and a coupler having a shank secured to the yoke, the units operating in alternation to resist movements of the coupler and yoke produced by forces in buff and
20 draft applied to the coupler and being installed under such compression that as one unit is compressed, the other expands.

3. In a vehicle, the combination of a pair of cushioning units lying in line lengthwise of the

vehicle, each unit being made up of alternate rubber-bearing and separator plates and follower blocks at the ends of the unit, stops on the vehicle structure engaged by the blocks at the remote ends of the units, a yoke encircling the outer unit 5 only and having an end member lying between and in contact with the blocks at the adjacent ends of the units, the contacting surfaces of the last named blocks and end member being formed on substantially spherical curvatures permitting 10 universal movement of the yoke relative to the units, and a coupler having a shank rigidly connected to the yoke, the units operating in alternation to provide the sole resistance to move- 15 ments of the coupler and yoke produced by forces in buff and draft applied to the coupler and being installed under such compression that the expansivity of each unit is not substantially less than the amplitude of the movements of the coupler and yoke against the resistance of the other 20 unit produced by forces applied to the coupler under normal running conditions.

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