

June 9, 1959

W. J. METZGER
RAILWAY DRAFT RIGGING

2,889,940

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3 Sheets-Sheet 1

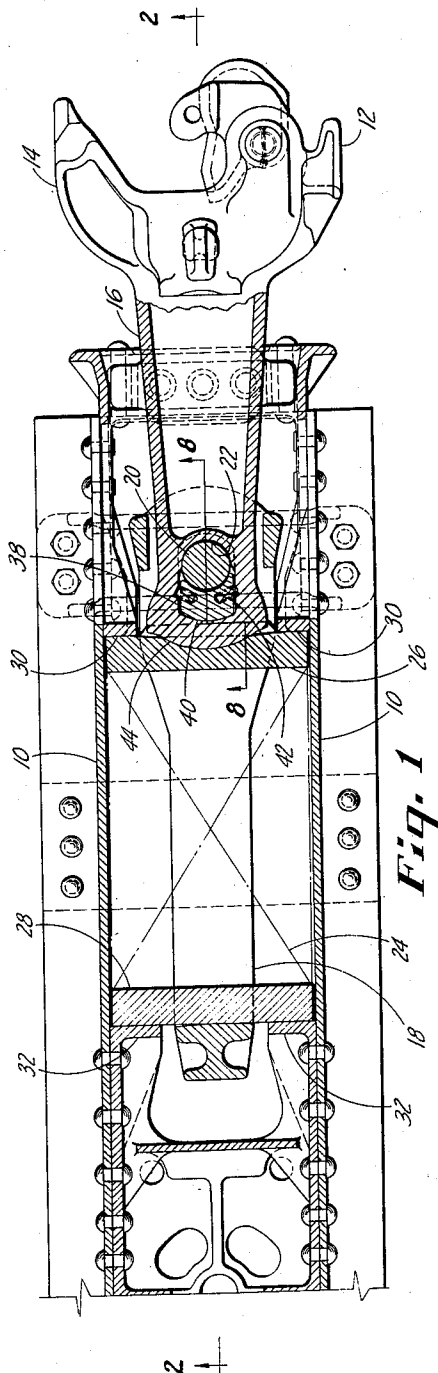


Fig. 1

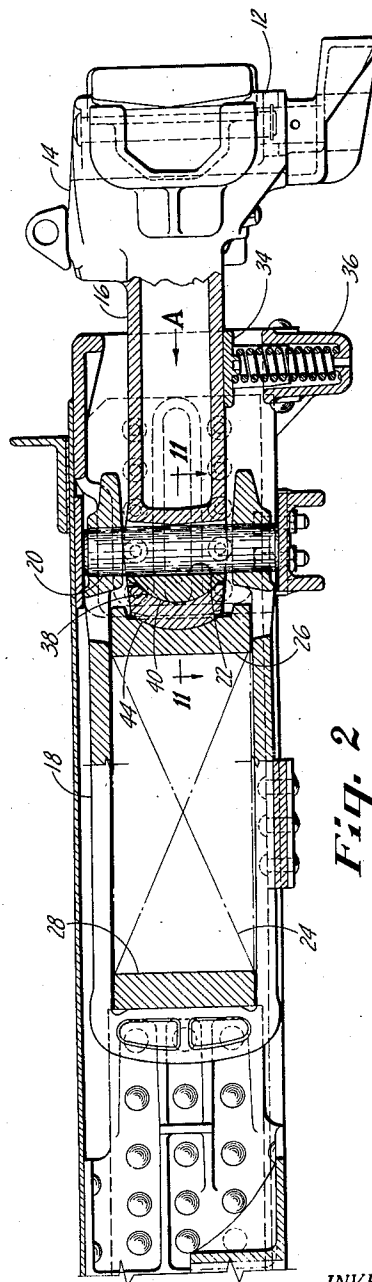


Fig. 2

INVENTOR.
WILLIAM J. METZGER

BY

Henry Kozak

ATTORNEY

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3 Sheets-Sheet 2

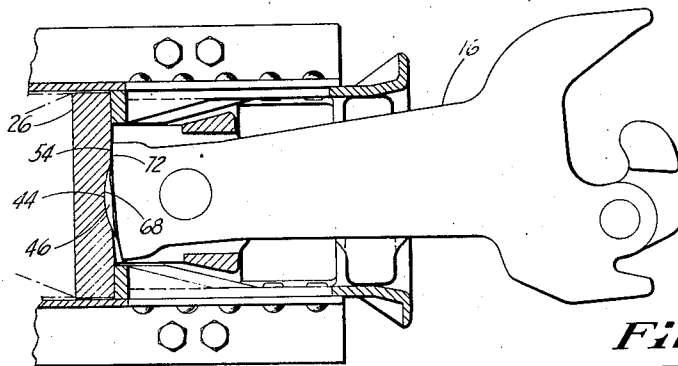


Fig. 3

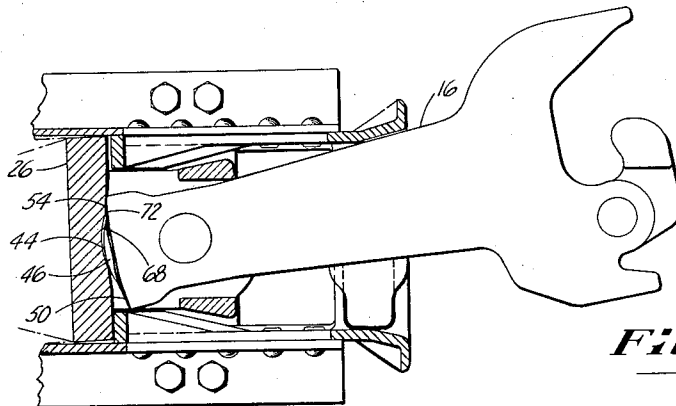


Fig. 4

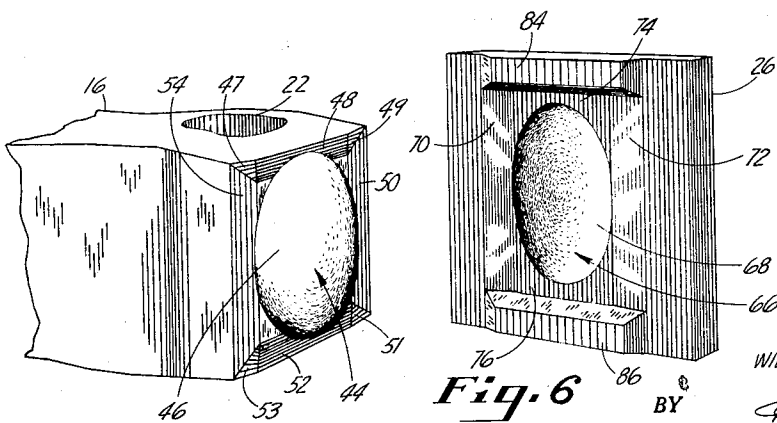


Fig. 5

Fig. 6

INVENTOR.
WILLIAM J. METZGER

BY *Henry Rozak*

ATTORNEY

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3 Sheets-Sheet 3

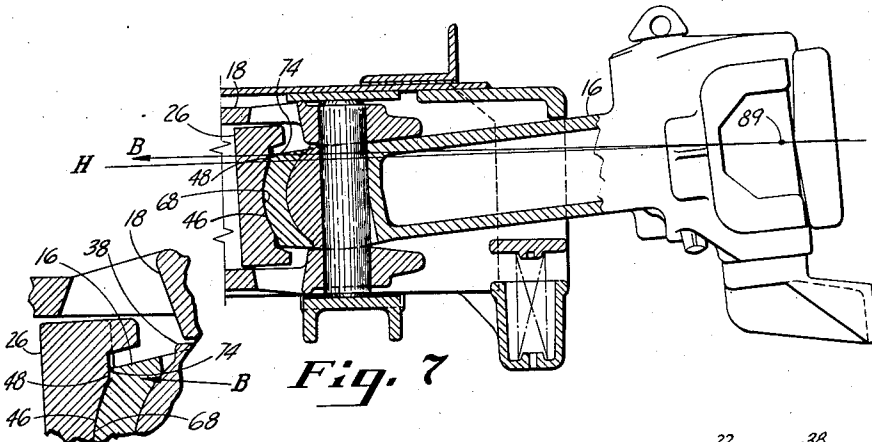


Fig. 7

Fig. 7a

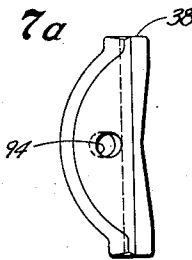


Fig. 9

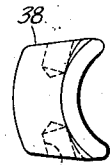


Fig. 10

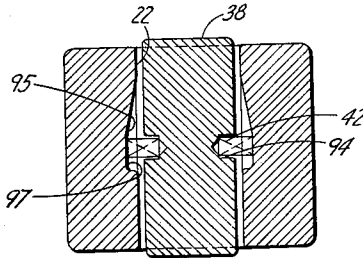


Fig. 13

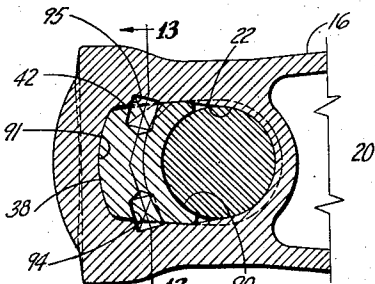


Fig. 11

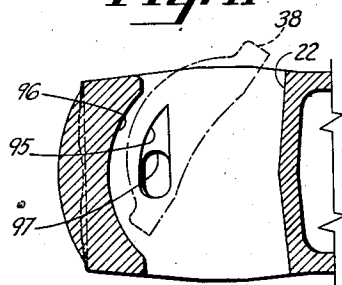


Fig. 12

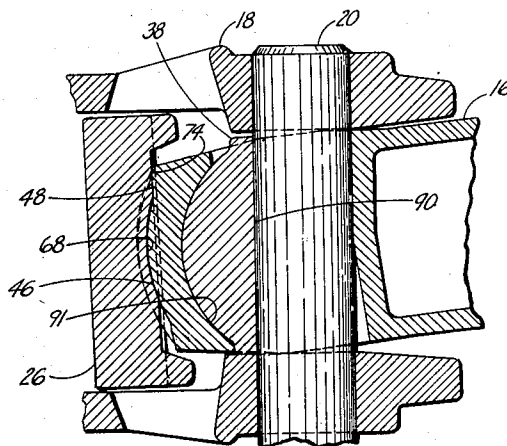


Fig. 8

INVENTOR.
WILLIAM J. METZGER

BY

Henry Kozak

ATTORNEY

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2,889,940

RAILWAY DRAFT RIGGING

William J. Metzger, East Cleveland, Ohio, assignor to National Malleable and Steel Castings Company, Cleveland, Ohio, a corporation of Ohio

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9 Claims. (Cl. 213—69)

This invention relates to railway draft rigging and more particularly to a novel improved car coupler shank and draft gear follower assembly.

It is well recognized that under unusual or extreme service conditions, particularly when car couplers are subjected to buffing forces while horizontally or vertically angled to substantially the limit of their free swing, there is danger of derailments in the case of excessive horizontal angling, or danger of a high car being lifted off its truck in the case of excessive vertical angling.

The present invention alleviates these conditions by providing means to freely accommodate limited horizontal or vertical angling of the coupler, and to restrict the angling of said coupler when it is horizontally or vertically angled beyond a predetermined amount.

The invention generally comprises means for providing a full surface-to-surface engagement between the coupler shank and draft gear follower for all horizontal and vertical angling positions of the coupler. More specifically, provision is made for a ball-socket type of engagement between the rear surface of the coupler shank and the forward surface of the forward draft gear follower whenever the coupler is horizontally or vertically angled within a predetermined range, and for a flat surface engagement between these surfaces whenever the coupler is horizontally or vertically angled beyond a predetermined amount. The engaging surfaces on the shank and follower are so disposed that whenever the coupler is angled beyond a predetermined range, a restoring force is set up which tends to return the coupler within said predetermined range. Also, this construction substantially reduces the wear between the shank and follower.

Another feature of the invention comprises a spring retained pin bearing block for the coupler shank pin hole that is simple to install and is self-centering.

It is a primary object of the invention to provide a coupler shank and draft gear follower assembly which tends to prevent the coupler from angling horizontally or vertically freely beyond predetermined vertical and horizontal ranges.

Another object of the invention is the provision of a coupler shank and draft gear forward follower assembly wherein there is a ball and socket contact between these parts whenever the coupler is angled horizontally or vertically within predetermined vertical and horizontal ranges.

A further object of the invention is the provision of a coupler shank and draft gear forward follower assembly wherein a flat surface contact is established between these parts whenever the coupler is angled horizontally or vertically beyond predetermined horizontal and vertical ranges.

A further object of the invention is to provide a coupler and draft gear assembly, which when the coupler is angled beyond a predetermined range, will direct a buffing force, which is applied to the coupler, so as to return the coupler within said range.

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A further object of the invention is to provide improved contact between a coupler shank and follower whenever the coupler is subjected to a buffing force and is angled excessively either horizontally or vertically.

A further object of the invention is to provide a coupler shank and draft gear follower assembly having novel improved contact surfaces on the shank and follower, including a spherical recess on the follower and aligning shoulders on the shank, wherein said shank aligning shoulders will not enter said spherical portion even under extreme coupler angling conditions.

A specific object of the invention is to provide an improved coupler shank and draft gear follower assembly in which a pin bearing block is contained within the coupler shank pin hole, the block being maintained in place by rearwardly directed spring means.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, in which:

Fig. 1 is a longitudinal horizontal sectional view of a coupler and draft gear assembly embodying the invention, the coupler head being shown in full.

Fig. 2 is a vertical sectional view taken along line 2—2 of Fig. 1, the coupler head being shown in full.

Fig. 3 is a longitudinal horizontal view, partly in section, of a coupler draft gear assembly showing the maximum amount the coupler may be angled horizontally at which there is still full surface ball and socket engagement between the follower and the coupler shank.

Fig. 4 is a view similar to Fig. 3 but showing the coupler horizontally angled at substantially the limit of its horizontal swing.

Fig. 5 is a perspective view of the rear portion of the coupler shank.

Fig. 6 is a perspective view of the forward end of the draft gear forward follower.

Fig. 7 is a view similar to Fig. 2, but showing the coupler angled upwardly at substantially the limit of its vertical swing.

Fig. 7a is an enlarged fragmentary view of that portion of Fig. 7 showing the engagement between the upper end of the shank and follower.

Fig. 8 is an enlarged sectional view taken along line 8—8 of Fig. 1, showing the coupler shank angled vertically the same amount as in Fig. 7.

Fig. 9 is a side elevational view of the coupler pin bearing block.

Fig. 10 is a plan view of the coupler pin bearing block.

Fig. 11 is a longitudinal horizontal sectional view taken along line 11—11 of Fig. 2.

Fig. 12 is a central vertical sectional view of the rear portion of the coupler shank showing in dot-dash the pin bearing block partially inserted in the pin opening in the coupler shank.

Fig. 13 is a transverse sectional view of the pin bearing block and coupler shank assembly taken along line 13—13 of Fig. 11.

Referring to the drawings and particularly to Figs. 1 and 2, there is shown a coupler and draft gear assembly disposed between center sills 10—10 of a railway car end sill structure. Coupler 12, which is of the interlocking type, comprises a head 14 and a shank 16. Shank 16 is received within the forward end of yoke 18 and is pivotally secured thereto by a vertical pin 20 extending through pin hole or opening 22 in the shank. Yoke 18 contains a conventional draft gear comprising a cushioning mechanism 24 (shown in dot-dash) and front and rear followers 26 and 28, respectively, in engagement with front and rear draft lugs 30 and 32, respectively, on sills 10. The forward portion of the coupler is supported by a spring supported coupler car-

rier 34 which is contained in the lower portion of striking casting 36. Pin opening 22 in the shank contains pin bearing block 38, in addition to pin 20, which engages pin 20 and has complementary arcuate thrust engagement as at 40 with shank 16 at the rear extremity of opening 22. Bearing block 38 is centered and retained in opening 22 by means of springs 42. The rear surface or end of shank 16 is in complementary thrust engagement with front follower 26 whenever the coupler is subjected to a buffing force as will be hereinafter explained in more detail.

Reference is now made to Figs. 5 and 6, which show respectively the surface details of the rear portion of the coupler shank and the details of the forward thrust receiving surface of draft gear front follower 26. The rear surface or end 44 of the shank comprises a centrally disposed spherical projection 46, which is adapted for a ball-socket type of engagement with centrally disposed spherical recess 68 in the follower. Disposed laterally of projection 46 are flat forwardly and outwardly tapering surfaces 50 and 54 which are adapted for engagement with flat, correspondingly tapered surfaces 70 and 72 on the follower when the coupler is horizontally angled beyond a predetermined range. Disposed at the top and bottom of and adjacent to projection 46 are flat, forwardly tapering surfaces 48 and 52, respectively, which are adapted for engagement with flat surfaces 74 and 76, respectively, when the coupler is vertically angled beyond a predetermined range. Positioned adjacent the top and bottom of thrust receiving surface 66 on the follower are transversely extending reinforcing ribs 84 and 86, respectively.

In addition to the aforementioned engagement of surfaces on vertical angling, there is also contact between upper beveled surfaces 47 and 49 on the shank and follower surfaces 72 and 70, respectively, when the coupler shank is angled upwardly, and when the shank is angled downwardly there is contact between lower beveled surfaces 51 and 53 on the shank and follower surfaces 70 and 72, respectively. Thus, on vertical angling in either direction beyond a predetermined range, three surfaces on the shank engage three corresponding surfaces on the follower, this construction affording a surface-to-surface engagement for transmission of buffing forces from the coupler to the draft gear.

Under abnormal operating conditions, as for example when car couplers are subjected to a buffing force and are horizontally or vertically angled to substantially the limit of their swing, there is danger of derailments in the case of excessive horizontal angle, or danger of a high car being lifted off its truck in the case of excessive vertical angling. An interlocking coupler must be capable of angling vertically approximately $1\frac{1}{2}$ inches up or down from its normal level position and horizontally approximately 2 inches from its central position. It will be understood, however, that extreme operating conditions will cause the couplers to angle beyond the above ranges, thus producing a dangerous operating condition, particularly when the couplers are subjected to a buffing force.

Referring to Fig. 3, wherein the coupler is horizontally angled approximately 2 inches from its central position, it will be seen that full surface ball-socket engagement exists between projection 46 and recess 68 and initial contact is established between surfaces 54 on the shank and surface 72 on the follower. As the coupler continues to angle horizontally an additional amount beyond the two-inch limit, shank rear surface 44 is displaced transversely relative to follower 26 and a condition as shown in Fig. 4 is reached wherein there is no longer a full surface ball-socket engagement between projection 46 and recess 68. There is, however, at this point full surface engagement between surface 54 on the shank and surface 72 on the follower for receiving the

buffing forces from the coupler, this being an important feature of the invention.

In prior constructions having the aligning shoulders on the coupler shank and a partial ball-socket type of engagement between the shank and follower, a line-to-surface or a point-to-surface type of contact exists between the shank and follower. Also in prior constructions, with the coupler only partially angled horizontally, the lateral edges of the shank shoulders entered the spherical portion of the follower. Obviously, such construction causes severe premature wear of the shank and follower abutment surfaces. With the present invention, wherein there is at all times a full surface ball-socket engagement or a flat surface-to-surface engagement between the shank and follower, the wear between these parts is substantially reduced.

This feature of full surface engagement between the shank and follower also exists when the coupler is angled vertically, as shown in Figs. 7, 7a and 8, wherein the coupler is angled upwardly at substantially the limit of its vertical swing. In this instance, and referring particularly to Figs. 7a and 8, there is full surface contact between upper surfaces 47, 48 and 49 on the shank and surfaces 70, 74 and 72, respectively, on the follower as aforementioned.

It will be noted in Figs. 4, 7, 7a and 8 that the engaged end of the follower is disposed slightly rearwardly of its neutral position. This condition results from the eccentric loading and the resulting amount of compression of the cushioning mechanism of the draft gear occurring during angling movement of the coupler to the position shown in these views and assures that surface engagement will be effected.

The difference in height between an empty freight car and one that is fully loaded may be as much as three inches. When an empty car is coupled to a loaded one on level track the allowable three inches difference in height means that one coupler is lifted $1\frac{1}{2}$ inches and the other is depressed a similar amount. In the case of relatively short freight car couplers, the line of draft and buffing forces between these cars then lies at an angle of about 3 degrees to the horizontal. Under severe buffing forces the vertical component of this angular force tends to lift the light car and to depress the heavy one, thus causing a further difference in the height of the two cars. The fact that conventional interlocking couplers now in service must be given a degree of vertical freedom greater than that which is necessary merely to take care of level track conditions means that under extreme buffing forces the light car could rise and the heavy car depress until their difference in height amounts to approximately $5\frac{1}{2}$ inches. If these buffing forces are severe enough and exist for a sufficiently long period of time, it is conceivable that the light car might be lifted off its trucks, at least at the end receiving the buffing force.

Referring again to Fig. 7, it is assumed for the purposes of illustration that the coupler shown therein is attached to a low car. When the coupler is at the midpoint of its vertical swing as shown in Fig. 2, there is a full surface ball-socket engagement between projection 46 on the shank and recess 68 on the follower and any buffing force applied to the coupler is directed substantially along the center line of the coupler as represented by force A in Fig. 2. However, when the coupler is angled vertically upward beyond the $1\frac{1}{2}$ inch limit, the ball-socket engagement ceases, but a surface-to-surface contact between the shank and follower occurs, as previously explained. As a result, the buffing force of the coupler is now directed substantially through the central portion of these contacting surfaces and through point 89, which is the point of intersection of the coupling line of the coupler and the coupler horizontal center line, said force now being shown as force B in Figs. 7 and 7a. It is

to be particularly noted that force B is directed above a line horizontal with the car as represented by line H in Fig. 7, which along with force B passes through the aforementioned point 89. It will be obvious that if the coupler shown in Fig. 7 is coupled to another like coupler and draft gear assembly embodying the invention, force B will be directed through the central portion of the corresponding engaging surfaces on the lower end of the shank and follower therein, the second named coupler and draft gear assembly being attached to a high car. Thus, in the latter or high car coupler and draft gear assembly, force B would be directed through the central portion of lower contacting surfaces 51, 52, and 53 on the shank and surfaces 70, 76 and 72, respectively, on the follower. Thus it will be seen that the coupler shown in Fig. 7 will impart a downward buffing force to the opposing coupler of the high car. This downward buffing force acts along the line of force B, but in the opposite direction and will tend to force the high car downward, thereby eliminating the danger of the car being lifted off its trucks.

With reference to Figs. 8 through 13, a self-centering and self-retaining pin bearing block 38 is provided as an additional feature of the invention. In Figs. 11 and 13, coupler shank 16 and bearing block 38 are illustrated in assembled relationship prior to assembly of the shank with yoke 18 and pin 20. It will be seen that pin opening 22 receives pin 20 and pin bearing block 38, said bearing block being in complementary engagement with said pin as at 90 and with the shank as at 91, as best shown in Figs. 8 and 11. Bearing block 38 is maintained in preassembled relationship with shank 16 by springs 42, which are carried within openings or pockets 94 (Figs. 9, 10, 11 and 13) in the bearing block. Each spring 42 reacts between one side of the bearing block and the adjacent side of opening 22, the outer end of each spring being received in tapered groove 95.

On assembly of the bearing block in pin opening 22, springs 42 are placed in openings 94 in the bearing block and are held under compression therein by suitable clamp means. With the springs thus compressed, the bearing block (shown in dot-dash in Fig. 12) is inserted in pin opening 22 along the back wall 96 of the opening. Further insertion of the bearing block in opening 22 causes springs 42 to enter tapered grooves 95, the bearing block being fully positioned when springs 42 are seated in the oval portions 97 of grooves 95, as shown in Fig. 13. It will be seen that springs 42 are directed diagonally and rearwardly (Fig. 11), thus urging the bearing block into snug engagement with rear wall 96 of opening 22. This arrangement provides a self-centering and self-retaining feature for the bearing block.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

I claim:

1. In a railway car coupler and draft gear mechanism, a draft gear follower, a car coupler having a shank engaging said follower and means on said shank and follower providing surface engagement therebetween for vertical and horizontal angled positions of the coupler, said means comprising a ball and socket configuration encompassed by complementary flat abutment surfaces on said follower and shank, said surfaces on each said follower and shank commencing at the outer periphery of said configuration and extending transversely of said follower and shank.

2. In a railway car coupler and draft gear mechanism,

a draft gear comprising a forward follower, a car coupler having a shank engaging said follower and means on said shank and follower providing a ball and socket engagement therebetween to allow vertical and horizontal angling of the coupler, said ball and socket engagement occurring whenever said coupler is angled within a predetermined range and a flat surface-to-surface engagement occurring whenever said coupler is angled vertically or horizontally beyond said predetermined range, said means comprising a spherical surface on said shank adapted for engagement with a spherical surface on said follower, and flat abutment surfaces disposed peripherally of each of said spherical surfaces.

3. In combination, a draft gear comprising a forward follower and a car coupler having a shank engaging said follower, means on said shank and follower for changing the direction through said coupler of buffing forces imparted thereto whenever said coupler is vertically angled beyond a predetermined range, said means comprising at least one flat surface on said shank which is adapted for full surface engagement with at least one corresponding surface on the follower.

4. In a railway draft rigging a car coupler having a shank and draft gear follower engaging said shank, said follower having a forward surface comprising a spherical recess disposed centrally thereon, said shank having a rear surface comprising a spherical projection engageable in said recess, said recess and projection each having opposed complementary flat abutment surfaces disposed peripherally thereof, certain of said last-named surfaces being engageable upon predetermined vertical or horizontal angling of said coupler.

5. In a railway draft rigging a car coupler having a shank and a draft gear follower engaging said shank, said shank having a rear abutment surface thereon, said follower having a forward thrust-receiving surface engageable with said abutment surface, each of said surfaces having a spherically shaped bearing area encompassed by a plurality of flat abutment portions, certain of said abutment portions on said shank being engageable with complementary ones of said portions on said follower upon predetermined vertical or horizontal angling of said coupler.

6. A car coupler having a shank, said shank having a rear abutment portion comprising a spherical projection encompassed by a plurality of forwardly and outwardly tapering flat surfaces.

7. A car coupler according to claim 6 wherein said surfaces comprise at least two transversely spaced abutment surfaces and at least two vertically spaced abutment surfaces.

8. A draft gear follower having a forward surface comprising a spherical recess surrounded by at least four separate flat abutment surfaces joined directly to said recess, at least two of said abutment surfaces being forwardly and outwardly tapering.

9. A draft gear follower having a forward thrust receiving surface, said surface comprising a spherical recess disposed substantially centrally thereon, and forwardly and outwardly tapering flat surfaces disposed laterally of said recess and directly joined thereto.

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