Feb. 8, 1966 R. E. ABBOTT ETAL 3,233,747

RESTORING MECHANISM FOR RAILWAY DRAFT GEAR

Filed Jan. 22, 1964 4 Sheets-Sheet 1

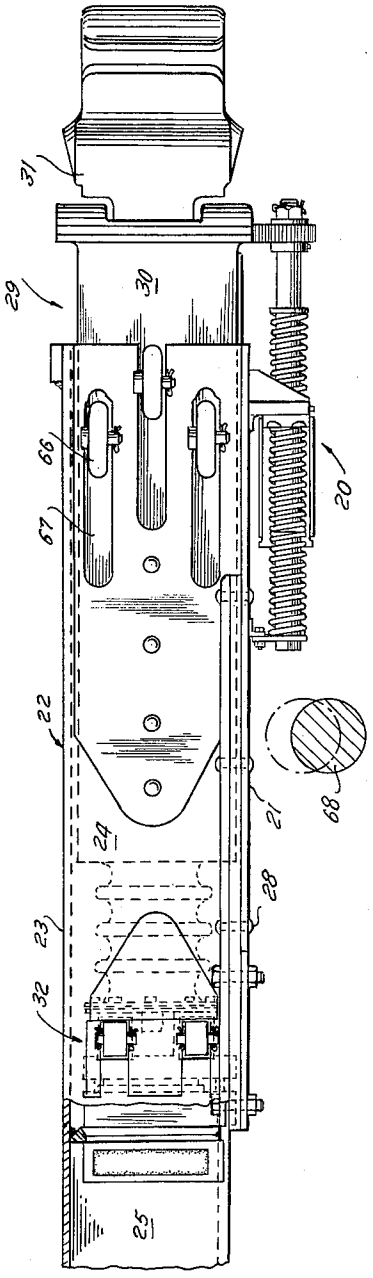



Fig. 1

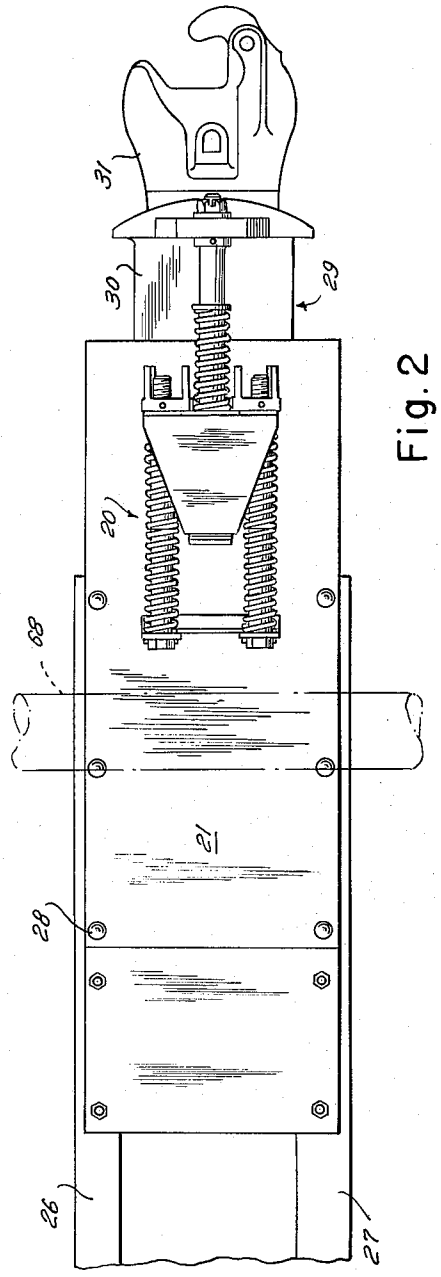



Fig. 2


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RESTORING MECHANISM FOR RAILWAY DRAFT GEAR

Filed Jan. 22, 1964 4 Sheets-Sheet 2

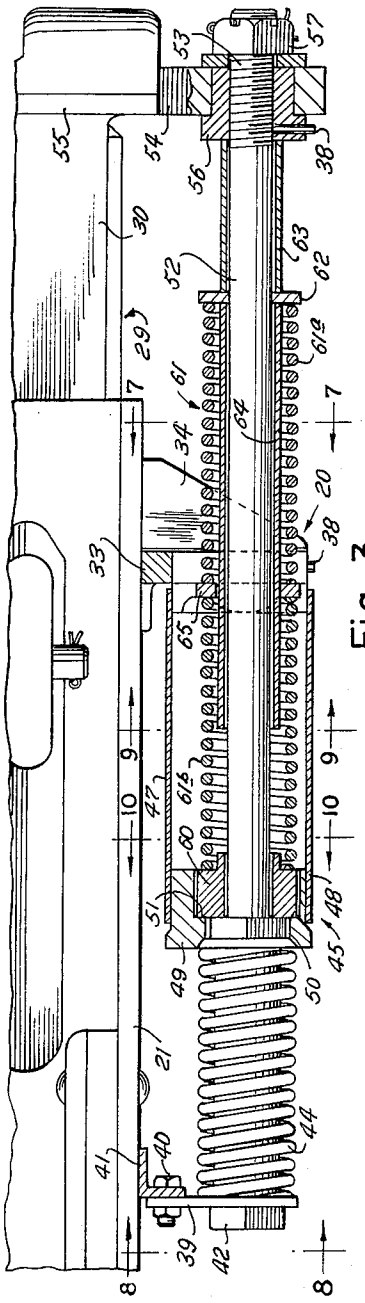


Fig. 3

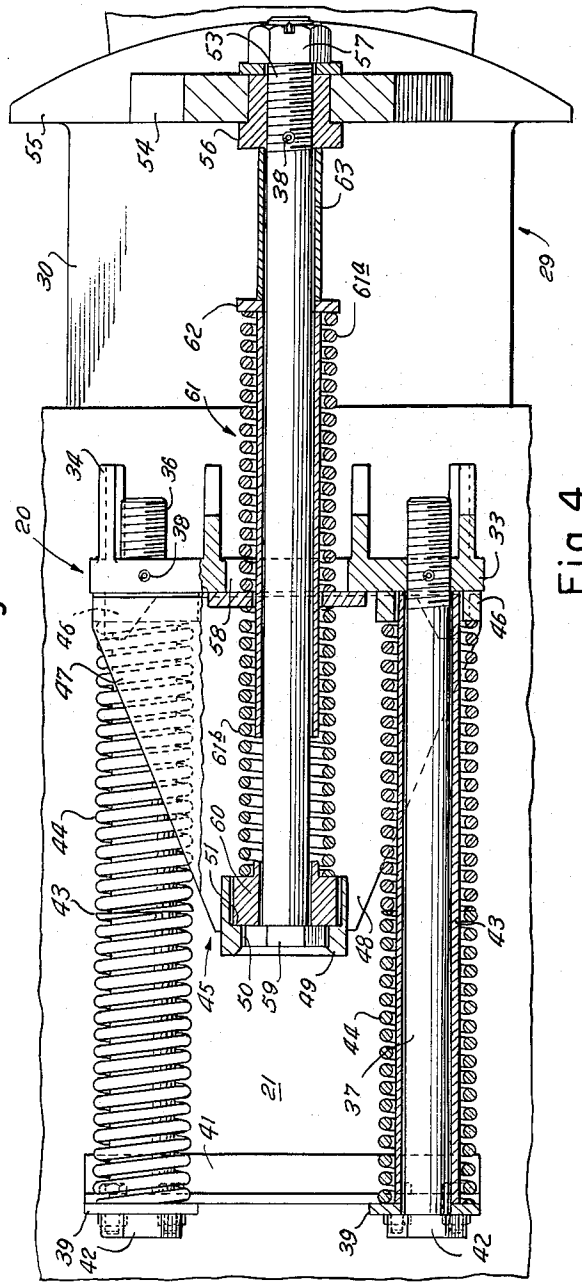


Fig. 4

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RESTORING MECHANISM FOR RAILWAY DRAFT GEAR

Filed Jan. 22, 1964 4 Sheets-Sheet 3

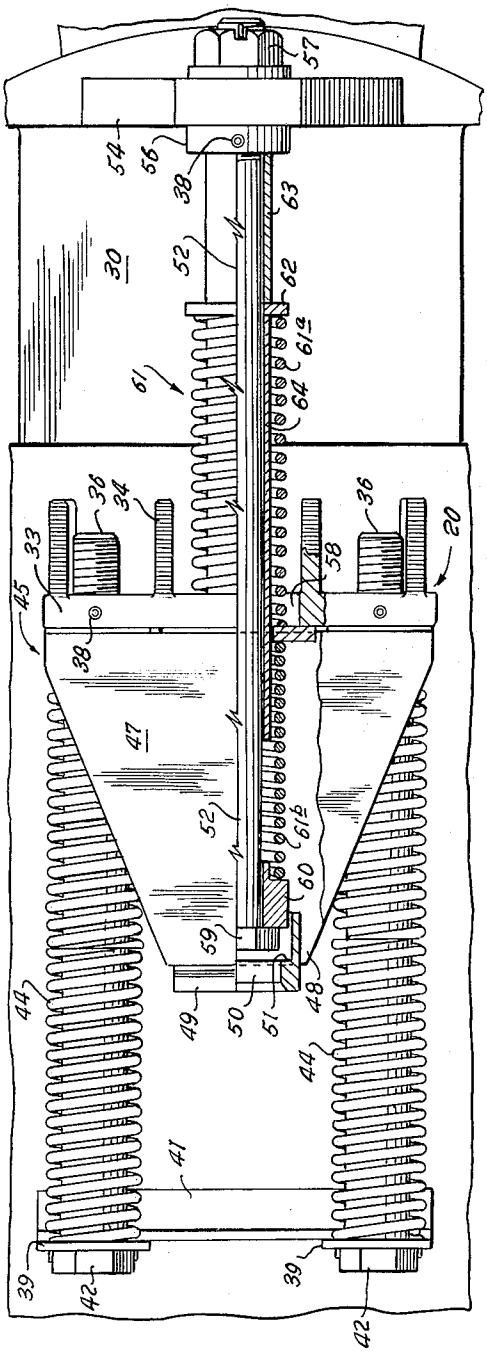


Fig. 5

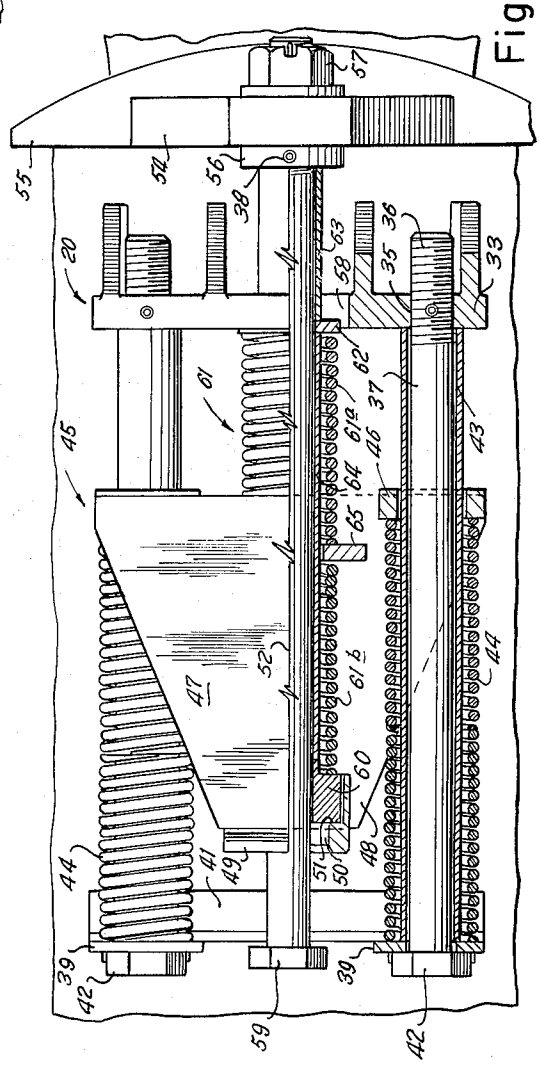


Fig. 6

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RESTORING MECHANISM FOR RAILWAY DRAFT GEAR

Filed Jan. 22, 1964 4 Sheets-Sheet 4

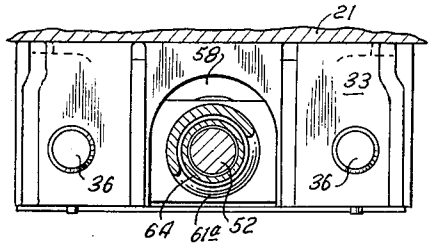



Fig. 7

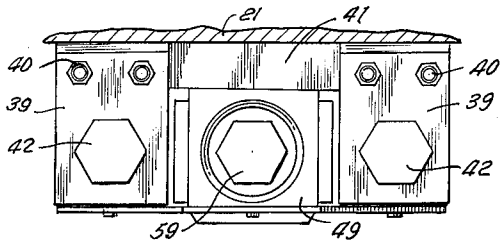



Fig. 8

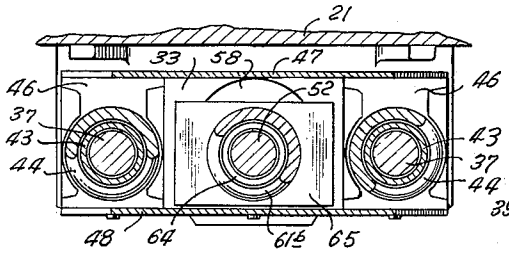



Fig. 9

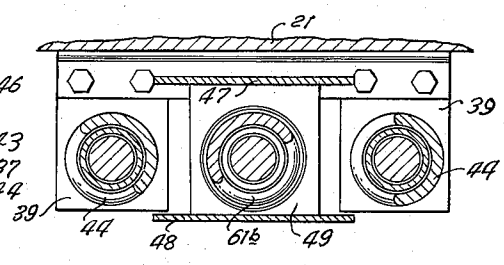



Fig. 10

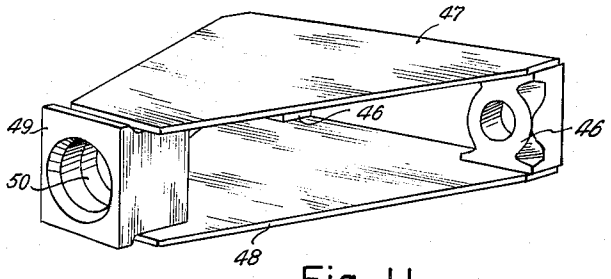



Fig. 11

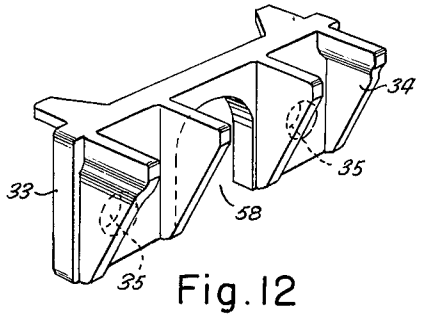



Fig. 12

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3,233,747

# RESTORING MECHANISM FOR RAILWAY DRAFT GEAR

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Filed Jan. 22, 1964, Ser. No. 339,535
5 Claims. (Cl. 213—7)

This invention relates to a mechanism for restoring a railway car draft appliance to its neutral position following displacement. The invention is particularly suited for use in conjunction with a draft appliance containing a hydraulic shock absorbing assembly.

Railway car draft appliances utilizing hydraulic buffer assemblies often require that a restoring mechanism be provided to restore the movable portion of the assembly to a neutral position after the draft appliance has absorbed either draft or buff forces. The railway car draft assembly disclosed in United States Patent 3,047,162, issued July 31, 1962 to William T. Blake, for "Hydraulic and Resilient Cushioned Railway Car Draft Assembly" utilizes a helical spring mechanism mounted underneath the center sill of the car to restore the movable portion of the hydraulic buffer mechanism to its neutral position after displacement. Restoring mechanisms constructed in accordance with the disclosure of the foregoing patent have found wide application in conjunction with hydraulic draft assemblies installed in both new and old railway cars. However, some of the railway cars of more recent construction have wheels of a greater diameter than those normally used on standard railway cars. These wheels have axles positioned so close to the underside of the car center sill that they do not permit a draft appliance restoring mechanism to be positioned on the bottom of the center sill above the axle.

Therefore, one object of this invention is to provide a compact draft appliance restoring mechanism that may be conveniently mounted adjacent the end of a railway car center sill.

Another object of the invention is to provide a draft appliance restoring mechanism that is short in length yet provides a large capacity for storing energy to return the draft appliance to its neutral position.

Still another object of the invention is to provide a draft appliance restoring mechanism wherein all of the spring units in the mechanism may be utilized to store energy when the draft appliance receives buff forces and only one of the spring units utilized when the draft appliance receives draft forces.

A further object of the invention is to provide a draft appliance restoring mechanism that is of simple construction and which may be readily attached to the underside of the center sill of a railway car.

The foregoing, and other aims, objects, and advantages of the invention as may appear hereinafter are realized in a mechanism for restoring a railway car draft appliance to its neutral position including bracket means fixed to the railway car adjacent to one end thereof. First spring means are mounted on the bracket means. Means are provided mounting the first spring means on the bracket means. A coupling rod is attached on one of its ends to the draft appliance and extends rearwardly through a portion of the bracket means. Second spring means is mounted on the coupling rod parallel to the first spring means. Means mounting the second spring means on the coupling rod is provided. Means are provided coupling the first spring means and the second spring means. The coupling means coacts with the coupling rod, the means mounting the second spring on the coupling rod, and the bracket means whereby rearward movement of the draft appliance produces compression of both the first spring means and the second spring means, while forward movement of the draft appliance produces compression of only the second spring means.



The details of construction and mode of operation of an exemplary mechanism embodying the present invention are described in the following description and depicted in the drawings as follows:

FIGURE 1 is an elevational view of one end of the center sill of a railway car having a draft appliance installed therein and a restoring mechanism in accordance with the present invention attached to the draft appliance and to the center sill;

FIGURE 2 is a bottom view of the assembly shown in FIGURE 1;

FIGURE 3 is an enlarged, partial, elevational view of the assembly with portions of the restoring mechanism shown in section;

FIGURE 4 is a bottom view on the same scale as FIGURE 3 of the assembly with portions of the restoring mechanism shown in section;

FIGURE 5 is a view similar to FIGURE 4 showing the position of the elements of the restoring mechanism when the draft appliance is in the full draft position;

FIGURE 6 is a view similar to FIGURE 5 showing the position of the elements of the restoring mechanism when the draft appliance is in the full buff position;

FIGURE 7 is a view taken along line 7—7 of FIGURE 3;

FIGURE 8 is a view taken along line 8—8 of FIGURE 3;

FIGURE 9 is a view taken along line 9—9 of FIGURE 3;

FIGURE 10 is a view taken along line 10—10 of FIGURE 3;

FIGURE 11 is a perspective view of the yoke of the restoring mechanism; and

FIGURE 12 is a perspective view of the bracket of the restoring mechanism.

Referring to the drawings, particularly to FIGURES 1 and 2, the exemplary restoring mechanism, designated generally by the numeral **20**, is attached to a cross plate **21** which extends across the opening in the bottom of the hollow center sill **22**. The center sill **22** includes a top plate **23** and longitudinally extending side walls **24** and **25**. The side walls have outwardly extending flanges **26** and **27** to which the cross plate is attached by means of rivets **28**. The center sill **20** provides the main support for the railway car body. The usual bolsters and trucks (not shown) support the railway car.

A draft appliance, designated generally by the numeral **29**, is mounted in the center sill and has a longitudinally slidable housing **30** projecting from the open end of the center sill. A car coupler **31** projects from the end of the housing. A double-acting hydraulic buffer mechanism (not shown) is contained within the housing. One end of the piston rod of the mechanism is attached to the center sill through an anchor assembly **32** at the rear of the housing. Details of construction and operation of railway car draft appliances that may be advantageously used with the restoring mechanism of the present invention may be found in the aforementioned Blake patent and also in United States Patent 2,944,681 issued July 12, 1960 to William T. Blake, for "Railway Draft Appliance." The draft appliance per se illustrated and described herein does not form any part of the present invention.

Referring now to FIGURES 3 and 4, the restoring mechanism **20** is provided with a mounting bracket **33** that is fixed by suitable means, such as welding, to the underside of cross plate **21** adjacent to the end of the

center sill 22. The bracket has triangular shaped reinforcing members 34 attached to the front face thereof. The bracket 33 and the reinforcing members 34 are preferably formed as an integral metal casting as shown in FIGURE 12, however, it may be made from metal plate by suitable means. The bracket 33 provides a threaded opening 35 adjacent each side. Each opening receives the threaded end 36 of a separate first spring mounting rod 37. Drive pins 38 received in aligned openings in the bracket and mounting rods prevent the rods from becoming accidentally unscrewed from the bracket. Each one of the mounting rods is supported at its rear end by a strap 39 which has an opening therein to receive the rod. The straps are attached by bolts 40 to an angle-iron hanger 41 welded to the underside of the cross plate 21, as may be more clearly seen in FIGURE 8. Each mounting rod 37 has an integrally formed bolt head 42 at the rear end thereof abutting the strap 39. Each mounting rod carries a close fitting, tubular spacer sleeve 43 that extends from the inner face of the strap 39 to the rear face of the bracket 33. A first helical spring 44 is mounted on each of the mounting rods 37. The spring 44 may be one continuous spring or it may be composed of two or more spring sections as illustrated in the drawings.

A yoke assembly, designated generally by the numeral 45, has a forward portion which includes two pickup collars 46, 46. A collar 46 is slidably mounted on each mounting rod 37 and is normally positioned in abutting relationship between the forward end of the first helical spring 44 and the rear of the bracket 33. Referring now to FIGURES 3, 4 and 11, the pickup collars, 46, 46 are joined together by the top plate 47 and bottom plate 48 of the yoke assembly. These plates are attached to the pickup collars by welding or other suitable means. The plates are tapered in outline and have a thrust collar 49 attached at their small ends. The thrust collar 49 is centrally positioned between the pair of first helical springs 44, 44 as may be seen in FIGURE 10. The pickup collars 46, 46 and the thrust collar 49 can be made from castings, or machined from steel block stock, and attached to the plates 47 and 48 by welding to make the unitary yoke assembly. The thrust collar provides a central opening 50. The opening is counterbored from the front face of the collar to provide a recessed shoulder 51 within the interior of the collar surrounding the opening 50.

A coupling rod 52 is attached on its forward threaded end 53 to a depending ear 54 on the underside of the housing flange 55. A collar 56 threadedly attached on the forward end of the coupling rod extends through an opening in the ear 54 and is retained therein by a nut 57. A drive pin 38 retains the collar in a fixed position on the end of the coupling rod. The coupling rod 52 extends rearwardly through a central opening 58 provided in the bracket 33 and terminates in a bolt head 59. The bolt head 59 is normally positioned in the opening 50 provided in the thrust collar 49 when the draft appliance 29 is in its neutral position. A bushing 60 is slidably mounted on the coupling rod at the rear end thereof and normally abuts on its rear face both the inside face of the bolt head 59 and the shoulder 51 provided inside the thrust collar 49. A second helical spring 61 is mounted in slight compression on the coupling rod. The rear end of spring 61 abuts the forward face of the bushing 60 and the forward end of the spring abuts a fixed washer 62 adjacent the forward end of the coupling rod. A spacer sleeve 63 surrounds the portion of the coupling rod extending from the forward face of the fixed washer 62 to the rear face of the collar 56. The sleeve is of such a length that when the collar 56 is screwed on the end of the coupling rod 52 it will force the sleeve to engage the washer 62 to place the second helical spring 61 under slight compression. A stop sleeve 64 surrounds a part of the length of the coupling rod extending from the rear face of the fixed washer 62 to the forward face of the bushing 60. The length of the stop sleeve 64 is slightly greater than the length of the second helical spring 61 when the spring is compressed to its maximum extent. The purpose of the stop sleeve 64 is to prevent the second helical spring from going solid when it is compressed between washer 62 and bushing 60 by rearward movement of the draft appliance housing 30. A floating washer 65 is slidably mounted on the coupling rod 52 and is normally positioned in abutting relationship with a portion of the rear face of the bracket 33 adjacent to the opening 58 as may be more clearly seen in FIGURES 7 and 9. The second helical spring 61 is shown in the drawings as being in two separate sections, a forward section 61*a* and a rearward section 61*b*. The floating washer 65 is positioned between the abutting ends of the two spring sections. However, it should be understood that the second helical spring 61 may be of one continuous length. The floating washer 65 may then be coupled to a continuous spring at about the midpoint of the spring by any suitable means, such as U bolts or welding.

The operation of the draft restoring mechanism of the present invention will now be explained with particular reference to FIGURES 1 through 6. The draft appliance is shown in the neutral position in FIGURES 1 through 4. When draft forces are applied to coupler 31, such as occurs upon the starting in motion of a train of coupled-up railway cars, the housing 30 moves forward until the housing keys 66, 66 engage the center sill sidewalls 24, 25 at the forward end of slots 67, 67. Referring now to FIGURE 5, it can be seen that the coupling rod 52 attached to the ear 54 will move forward with the housing. The bolt head 59 on the rear of the coupling rod picks up the sleeve 60 and moves it forwardly out of abutment with the shoulder 51 on the thrust collar 49. The rearward section 61*b* of the second helical spring is compressed between the thrust collar 60 and the floating washer 65 which is stopped by the bracket 33. The forward section 61*a* of the second spring, which is mounted under slight compression, expands between the floating washer 65 and the fixed washer 62. When the draft forces are relaxed, the energy stored in the rearward section 61*b* of the second spring 61 acts to move the coupling rod 52 rearwardly and restore the draft appliance 29 to its neutral position.

When the railway car receives buff forces on the car coupler 31, as when a standing car is coupled into a rearwardly moving train, the housing 30 moves rearwardly in the centers sill 22 allowing the draft appliance 29 to cushion the shock to the railway car. Referring now to FIGURE 6, it can be seen that rearward movement of the coupling rod 52 first produces compression of the second helical spring 61 between the fixed washer 62 and the bushing 60. The coupling rod bolt head 59 moves freely rearwardly through the opening 50 in the thrust washer 49 and leaves the bushing 60 engaged by the shoulder 51 of the thrust collar 49. The floating washer 65 moves out of abutment with the bracket 66 and slides over the mounting rod 52 as the spring 61 compresses. After the second compression spring 61 has compressed to an extent sufficient to overcome the force exerted by the pair of slightly compressed first helical springs 44, 44, the yoke assembly 45 begins to move rearwardly. The pickup collars 46, 46 of the yoke assembly slide rearwardly over the mounting rods 37, 37 to compress the pair of springs 44, 44. Thus, it can be seen that the second helical spring 61 and the pair of first helical springs 44, 44 act together in a progressive manner to absorb a portion of the buff forces imparted to the car coupler to store energy to return the draft appliance to its neutral position when the draft force is removed from the car coupler. If the draft forces are greater than can be absorbed by the hydraulic buffer mechanism of the draft appliance and the resisting force of the combined springs 61 and 44, 44, then the flange 55 on the housing 30 contacts the end of the center sill 22 and transfers any remaining buff forces directly to the center

sill. It is preferred that the length of the first helical springs **44**, **44** be selected so that the flange **55** will engage the end of the center sill **22** before the springs go solid. As seen in FIGURE 6, the stop sleeve **64** is long enough to engage the bushing **60** before the second spring **61** goes solid. The remaining force is then transmitted directly through the spacer sleeve **63**, the stop sleeve **64**, the bushing **60**, and the yoke assembly **45** to the springs **44**, **44**. The length of the coupling rod **52** is preferably selected so that the bolt head **59** does not extend rearwardly of bolt heads **42**, **42** of the mounting rods, **37**, **37** when the draft appliance is in the full draft position.

Referring now to FIGURE 1, one of the axles **68** of a truck for a railroad car having oversized wheels is shown in solid section in the position it assumes when the car is empty and in dotted outline in the position it assumes when the car is fully loaded. The draft appliance restoring mechanism of the present invention is located forwardly of the axle and does not extend over the axle even when the restoring mechanism is fully compressed by rearward movement of the draft appliance. By providing a telescoping three spring restoring mechanism, the device of the present invention provides a large energy storage capacity with a relatively small longitudinal movement of the three springs, as illustrated by the following example.

One exemplary form of the restoring mechanism of the present invention was designed for use with a draft appliance having a hydraulic buffer mechanism that had a total longitudinal travel of ten inches. The draft appliance was so constructed that when it was in the neutral position it could move nine inches to the rear in absorbing buff forces and one inch forward in absorbing draft forces. The restoring mechanism extended rearwardly from the flange **55** a total distance of only 35¾". Its maximum width was 12½". The coupling rod **52** has a length of 29$\frac{1}{16}$" excluding the bolt head **59** on the rear thereof. Each first spring mounting rod **37** had a length of 23$\frac{1}{16}$" excluding the bolt head **42**. The yoke assembly **45** was 12⅜" wide at its base or forward end and had a length of 11$\frac{11}{16}$". The first and second helical springs **44** and **61** utilized commercially available D5 Truck Springs meeting AISI Specification 8650–H or 8655. The springs had a free length of 10$\frac{5}{16}$", a solid length of 6$\frac{9}{16}$", an I.D. of 2⅛", an O.D. of 3⅜", and a solid capacity of 4,013 lbs.

The foregoing disclosure and description of the present invention is illustrative and explanatory thereof and, in light thereof, other modifications will be apparent to those skilled in the art. Therefore, the present invention is to be limited only by the scope of the appended claims.

We claim:

**1.** A mechanism for restoring railway car draft gear to the neutral position comprising:

(a) bracket means fixed to said railway car adjacent one end thereof;

(b) first spring means mounted on said bracket means;

(c) a coupling rod attached on one of its ends to said draft gear and extending rearwardly through a portion of said bracket means;

(d) second spring means mounted on said coupling rod parallel to said first spring means;

(e) means mounting said second spring means on said coupling rod;

(f) means coupling said first spring means and said second spring means, said coupling means coacting with said coupling rod, said means mounting said second spring on said coupling rod, and said bracket means whereby rearward movement of said draft gear produces compression of both said first spring means and said second spring means, while forward movement of said draft gear produces compression of only said second spring means.

**2.** A mechanism for restoring railway car draft gear to the neutral position comprising:



(a) bracket means fixed to said railway car adjacent one end thereof;

(b) first spring means mounted on said bracket means;

(c) a coupling rod attached on one of its ends to said draft gear and having its other end positioned rearwardly of said bracket means;

(d) second spring means mounted on said coupling rod, said second spring means having at least a portion of its length overlapping a portion of the length of said first spring means;

(e) means mounting said second spring means on said coupling rod;

(f) means coupling said first spring means and said second spring means, said coupling means coacting with said coupling rod, said means mounting said second spring on said coupling rod, and said bracket means whereby rearward movement of said draft gear produces compression of both said first spring means and said second spring means, while forward movement of said draft gear produces compression of only said second spring means.

**3.** A mechanism for restoring railway car draft gear to the neutral position comprising:

(a) a bracket member fixed to said railway car adjacent one end thereof;

(b) a pair of laterally spaced apart first helical spring mounting rods attached to said bracket and extending rearwardly therefrom;

(c) a first helical spring mounted on each of said spring mounting rods;

(d) a coupling rod attached at its forward end to said draft gear, said rod extending rearwardly through an opening provided in the central portion of said bracket member and having its rear end positioned a substantial distance from the rear face of said bracket member;

(e) a second helical spring mounted on said coupling rod, the forward end of said spring abutting the rear face of a floating washer surrounding said coupling rod, said washer, in turn, abutting the rear face of said bracket member, said washer being engaged on its front face by engaging means carried by and movable with said coupling rod, the rearward end of said second helical spring abutting a bushing slidably mounted on said coupling rod and retained thereon by stop means connected to the rear end of said coupling rod; and

(f) a yoke member having a forward portion slidably mounted on said spring mounting rods and engaging the forward ends of said first helical springs, and a rearward portion including a collar that abuts the rear face of said bushing positioned at the rear end of said coupling rod, said collar providing an opening to permit free passage of the stop means connected to the rear end of said coupling rod upon reciprocal movement of said rod.

**4.** A mechanism for restoring railway car draft gear to the neutral position comprising:

(a) a bracket member fixed to said railway car adjacent one end thereof;

(b) a pair of laterally spaced apart first helical spring mounting rods attached to said bracket and extending rearwardly therefrom;

(c) a first helical spring mounted on each of said spring mounting rods;

(d) a coupling rod attached at its forward end to said draft gear, said rod extending rearwardly through an opening provided in the central portion of said bracket member and having its rear end positioned a substantial distance from the rear face of said bracket member;

(e) a second helical spring mounted on said coupling rod, the forward end of said spring abutting a fixedly mounted washer on said coupling rod adjacent the forward end thereof, the rearward end of said second

helical spring abutting a bushing slidably mounted on said coupling rod and retained thereon by stop means connected to the rear end of said coupling rod, said second spring being coupled at about its midpoint to a floating washer surrounding said coupling rod and abutting the rear face of said bracket member;

(f) a yoke member having a forward portion slidably mounted on said spring mounting rods and engaging the forward ends of said first helical springs, and a rearward portion including a collar that abuts the rear face of said bushing positioned at the rear end of said coupling rod, said collar providing an opening to permit free passage of the stop means connected to the rear end of said coupling rod upon reciprocal movement of said rod.

5. A mechanism for restoring railway car draft gear to the neutral position comprising:

(a) a bracket member fixed to said railway car adjacent one end thereof;

(b) a pair of laterally spaced apart first helical spring mounting rods attached to said bracket and extending rearwardly therefrom;

(c) a first helical spring mounted on each of said spring mounting rods;

(d) a coupling rod attached at its forward end to said draft gear, said rod extending rearwardly through an opening provided in the central portion of said bracket member and having its rear end positioned a substantial distance from the rear face of said bracket member;

(e) a second helical spring mounted on said coupling rod, the forward end of said spring abutting a fixedly



mounted washer on said coupling rod adjacent the forward end thereof, the rearward end of said second helical spring abutting a bushing slidably mounted on said coupling rod and retained thereon by stop means connected to the rear end of said coupling rod, said second spring being coupled at about its midpoint to a floating washer surrounding said coupling rod and abutting the rear face of said bracket member, said second spring surrounding a rigid tubular sleeve mounted on said coupling rod between said fixed washer and said bushing, said sleeve having a length slightly greater than the length of said second spring when said spring is compressed to its maximum extent; and

(f) a yoke member having a forward portion slidably mounted on said spring mounting rods and engaging the forward ends of said first helical springs, and a rearward portion including a collar that abuts the rear face of said bushing positioned at the rear end of said coupling rod, said collar providing an opening to permit free passage of the stop means connected to the rear end of said coupling rod upon reciprocal movement of said rod.

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