April 28, 1953 J. R. CARDWELL 2,636,620

DRAFT GEAR

Original Filed May 12, 1948 3 Sheets-Sheet 1

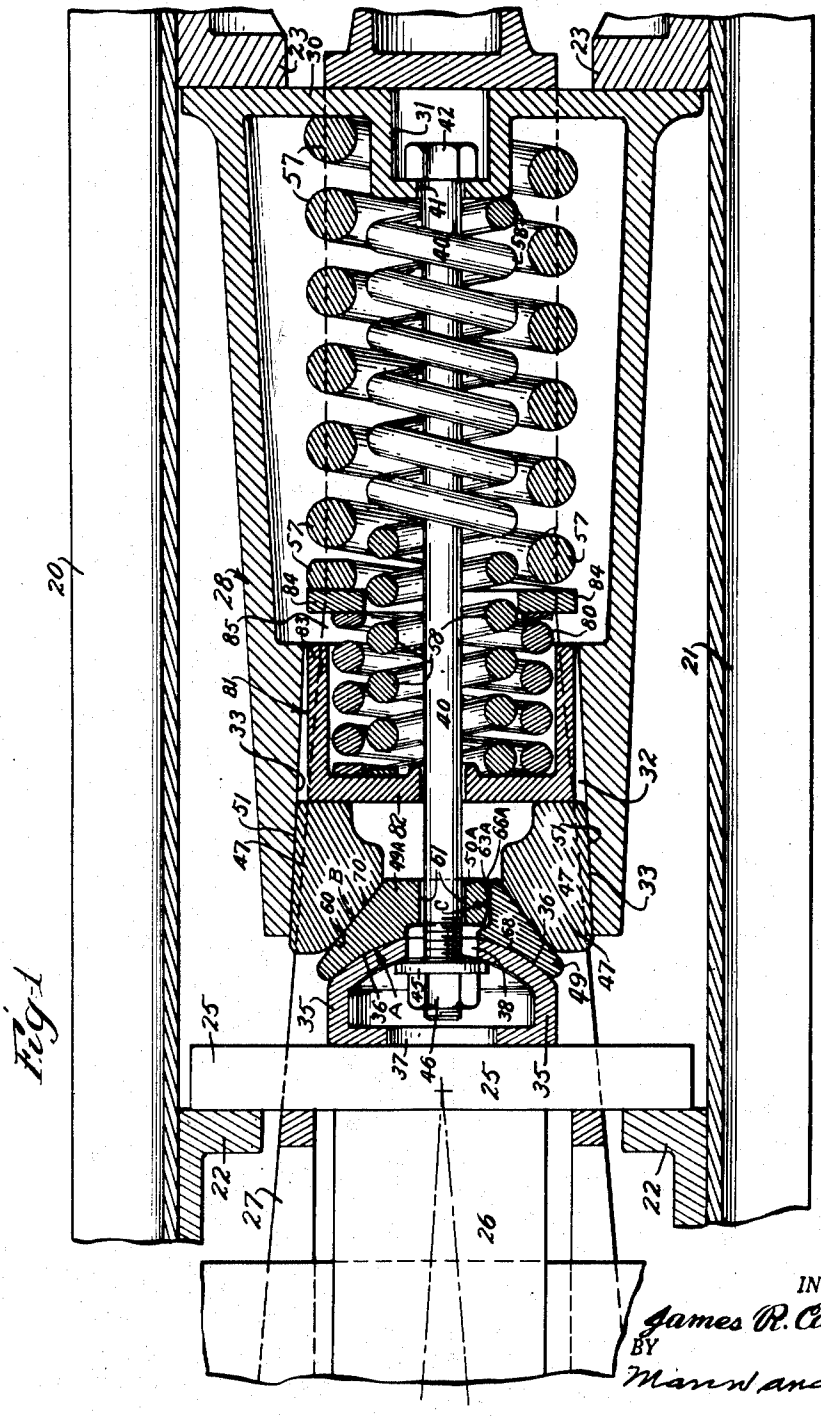

Fig. 1

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Fig-2

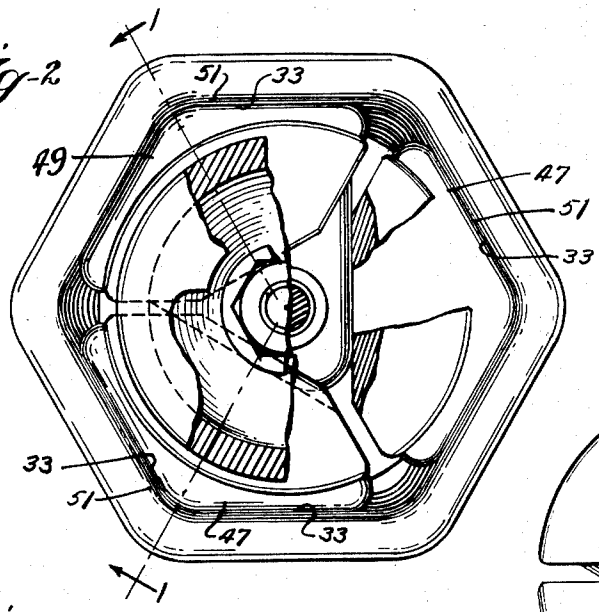


Fig-3

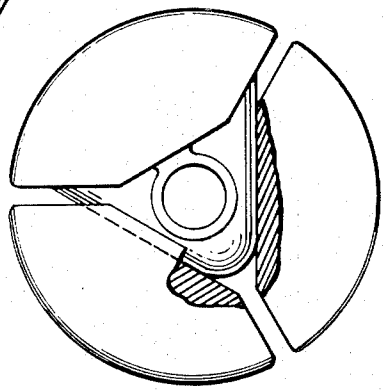
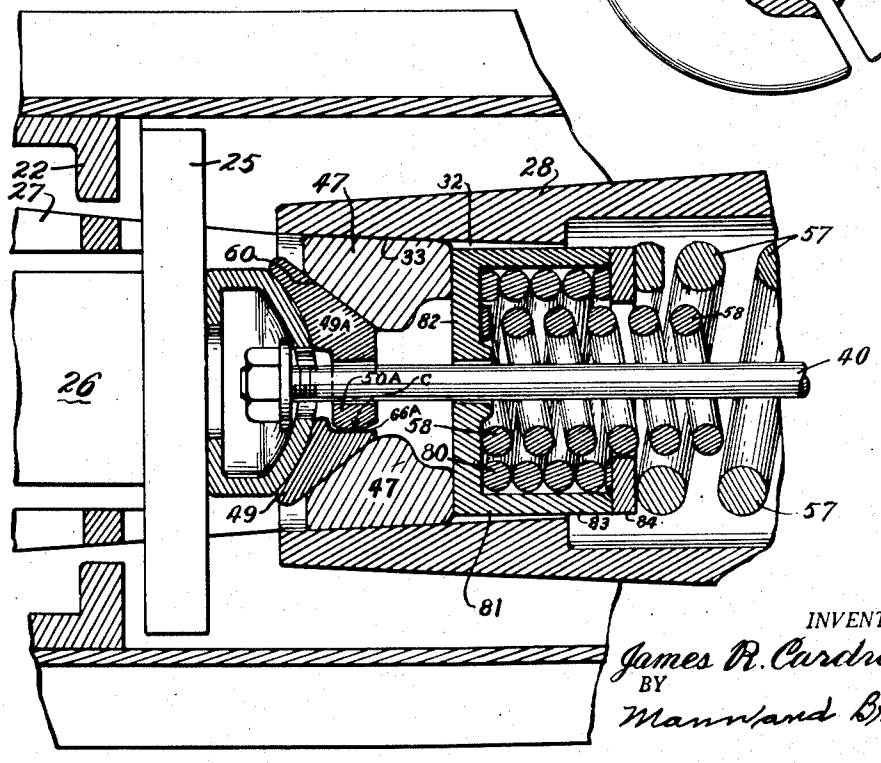


Fig-4



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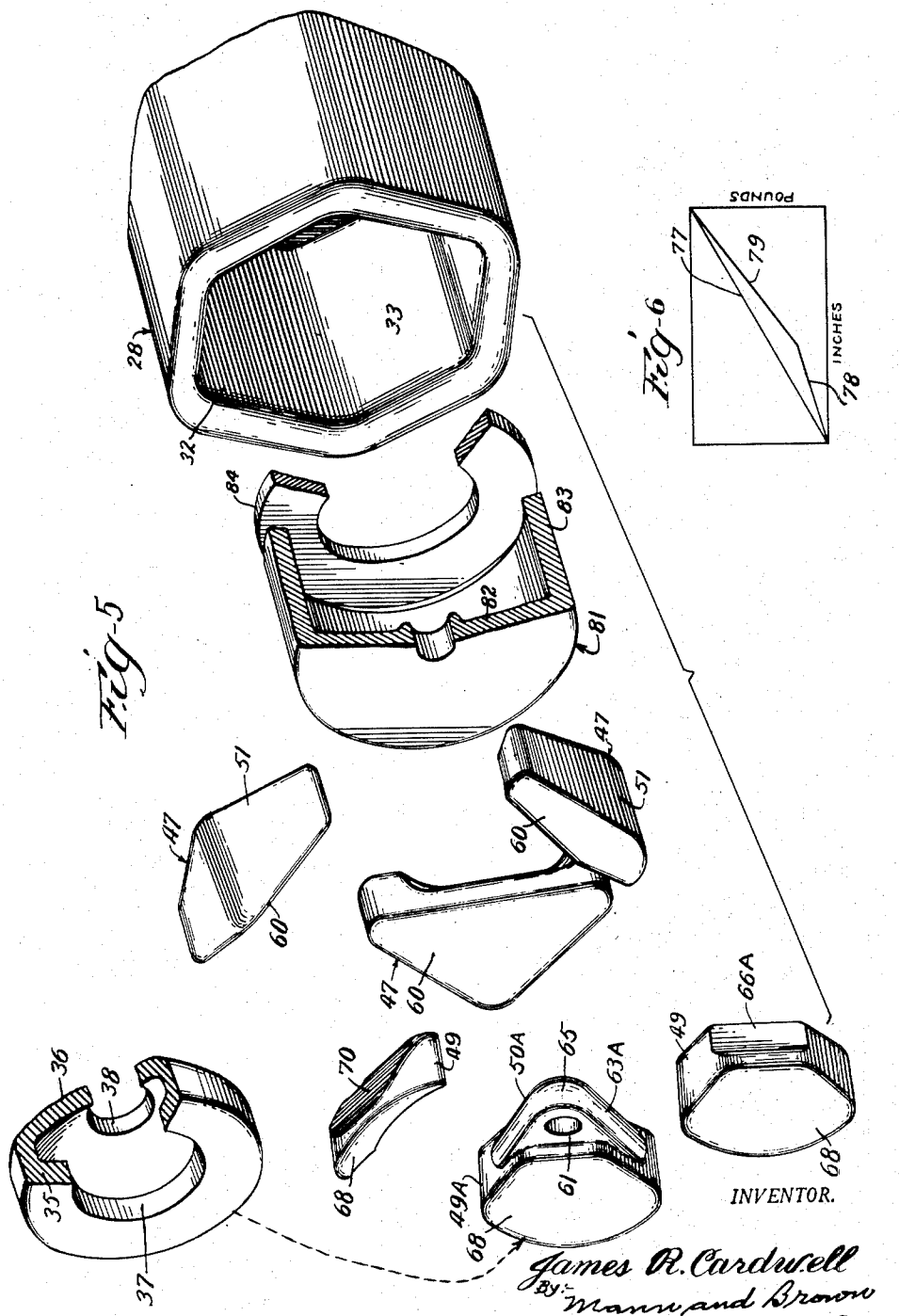

Fig-5

Fig-6

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UNITED STATES PATENT OFFICE

2,636,620

DRAFT GEAR

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Original application May 12, 1948, Serial No. 26,648. Divided and this application May 7, 1949, Serial No. 92,058

3 Claims. (Cl. 213—24)

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My invention relates to friction draft gears for railway cars and the principal object of the invention is to provide a gear of this type that is characterized by compactness, high capacity, and yet softness of action particularly during the preliminary travel of the gear.

Further and other objects of the invention will become apparent as the disclosure proceeds, and the description is read in conjunction with the accompanying drawings in which:

Figure 1 is a longitudinal sectional view through a draft gear built in accordance with this invention;

Figure 2 is an end view of the gear with parts broken away;

Figure 3 is a face view, or view in elevation, of the cluster of wedge members employed in the draft gear;

Figure 4 is a fragmentary view corresponding to Figure 1, but showing the draft gear after the preliminary travel, or partly compressed;

Figure 5 is an exploded view of the parts assembled in Figure 1; and

Figure 6 is a diagram comparing the characteristic curve of a high compression draft gear with the curve of the draft gear shown in Figures 1 to 5, inclusive.

This application is a division of my earlier application, Serial No. 26,648, filed May 12, 1948, which has now matured into Patent No. 2,496,442, granted February 7, 1950, and the disclosure of such patent is hereby incorporated in toto in the present application with the reference characters denoting the same parts in this application as in the heretofore-identified patented disclosure.

In the drawings, numerals 20 and 21 designate the center sills of a railway car, on which sills are mounted draft lugs 22 and buff lugs 23. The rectangular space defined by the two sills and the four lugs constitutes the pocket in which the draft gear is mounted. In accord with common practice, a follower, in the form of a plate 25, is inserted between the draft lugs 22 and the draft gear, this plate being in contact with the butt of the coupler 26. The draft gear is embraced by a draft yoke 27, which draft yoke is connected to the coupler 26 in a well known manner.

The draft gear shown in Figure 1 has a housing, generally designated 28, that is open at one end and is closed at the other end by a base wall 30, the base wall being offset to form an inwardly extending boss 31. Near its open end, the housing 28 forms a friction chamber 32 providing a

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friction surface or surfaces 33. Preferably the friction chamber 32 is of longitudinal tapering configuration, the walls that provide the friction surface 33 converging inwardly in longitudinal section as viewed in Figure 1. Rather than make the friction chamber 32 circular in cross-section, I prefer to employ a polygonal configuration, the particular friction chamber shown in Figures 1 to 4 being hexagonal.

At the open end of the friction chamber 32 is a follower or thrust member 35 in contact with the previously mentioned follower plate 25. It is contemplated that the thrust member 35 will have a convex inner face 36, in this instance, shaped as the segment of a sphere. The convexity of the inner face is required for a certain wedging effect, and the spherical configuration is preferred to make the follower movable universally to conform automatically with changes in the angularity of the follower plate 25 as the coupler 26 swings to various angles relative to the longitudinal axis of the car. The self-aligning thrust member 35, in maintaining constant face-to-face contact with the follower plate 25, avoids such wear as would be caused by relative movement between the thrust member and the follower plate. Preferably, the thrust member is of hollow construction, with a relatively large central aperture 37 on its outer wall and a smaller aperture 38 on its inner wall.

The draft gear is provided with the usual longitudinal restraining means in the form of an axially positioned bolt 40 extending from the base wall 30 of the draft gear casing to the thrust member 35. The bolt extends through an aperture 41 in the base wall boss 31, with the head 42 of the bolt inside the boss; and at the other end the bolt extends through the aperture 38 of the thrust member 35, the aperture 38 being sufficiently oversize with respect to the bolt to permit the required universal movement of the thrust member. Inside the thrust member 35 a suitable temporary washer 43, of lead or other frangible material, may be mounted on the bolt 40 along with a permanent metal washer 45, the two washers being retained by the usual nut 46. The purpose of the temporary washer 43 is to hold the draft gear initially in sufficiently contracted state to permit the draft gear to be installed in the draft gear pocket. Immediately after installation the temporary washer 43 is ruptured by load forces and drops away to permit the draft gear to expand to the full length of the pocket.

The particular friction device employed in the

draft gear of this inventian may take various forms, but I prefer to use the friction device disclosed in my prior Patent No. 2,496,442, wherein the specific components and their coaction are described in detail. Since the instant application is a division of said Patent No. 2,496,442, reference characters found on the drawings of the instant application correspond with those of the earlier patent, and the specific parts therefore need not be described in detail here. Suffice it to say that the friction device comprises a plurality of friction shoes 47 which bear against the friction surface 33 of the friction chamber 32, and a plurality of wedge members 49 which distribute the buff and draft loads evenly over the friction shoes as these loads are imparted to the thrust member 35.

The present invention is particularly concerned with the spring means employed in conjunction with the friction device, and in the embodiment of the invention shown in Figures 1 to 5, inclusive, the spring means comprises a first relatively light spring 58 over which is telescoped a second relatively light preliminary travel spring 60 which acts in tandem with a third spring 57 of relatively heavy construction. A stepped follower 81, here shown as cup-shaped, comprises a disk portion 82 receiving the thrust of the outer ends of the inner spring 58 and the preliminary travel spring 60, and the follower has an outer flange or rim portion 83 surrounding the preliminary spring portion 80. Between the free end of that rim portion 83 and the adjacent end of the outer spring 57, there is an inner spring seat or auxiliary follower 84 of sufficent depth to extend between the adjacent ends of the preliminary travel spring 60 and the outer spring 57 substantially as shown in Figures 1 and 4.

The disk portion 82 of the follower 81 is seated upon the friction device, in this case the friction shoes 47, and the rim portion 83 is normally spaced from the auxiliary follower 84 as indicated at 85 to permit preliminary travel of the draft gear while compressing the preliminary travel spring 60 and before effectively compressing the outer spring 57. For instance, in a high capacity draft gear having 2⅝ inches total travel, the preliminary travel might be on the order of ¾ of an inch.

This is illustrated in the diagram of Figure 6 in which the load deflection line 77 represents the load deflection characteristics of a high compression draft gear with the inches of travel of the gear being plotted as abscissas and the pounds of pressure as ordinates (the initial compression and corresponding effects being ignored). With the spring means employed in the instant invention, that curve is modified by introducing a preliminary travel corresponding to the line 78 followed by a further travel corresponding to the line 79 plotted in substantially the same way as 77. The effect of this is to permit a comparatively low resistance to preliminary travel of the draft gear under a compression of applied load to soften the effect on the car and reduce the steepness of the load deflection curve indicated by the line 77. Thereafter the travel is indicated by the line 79 and the result may be that the draft gear will have the same capacity if that is desired.

It will be understood that upon initial compression of the draft gear upon applied load, the inward movement or travel of the friction members 47 would be resisted by the preliminary travel spring 60 and the inner spring 58 acting in parallel during this preliminary travel of ¾ inch, and the friction developed between the outer friction surfaces 51 of the wedge member 47 and the inner friction surfaces 33 of the friction chamber 32 would be relatively low as compared with a draft gear such as shown in Figures 1 to 5, inclusive, of my earlier Patent No. 2,496,442. Hence, there would be a preliminary travel having the characteristics of easiness or softness. At the end of that travel, the rim portion 83 of the follower 81 closes against the spring seat 84, and further travel would be resisted by the combined actions of the inner spring 58 and the relatively heavy spring 57 with the consequence that the friction between the wedge members 47 and the casing 26 would be enormously increased and the capacity of the draft gear thus developed.

This manner of illustrating the improved preliminary travel feature of a high capacity draft gear is selected because of the minimum change required in conventional practice, but it is not intended to thereby impose an unnecessary limitation. Other forms will be readily designed.

This feature is a valuable accompaniment of the feature characterized by the novel thrust assembly which so readily collapses to release the parts upon release of the load, but it is also valuable in connection with other forms of high capacity draft gear.

I claim:

1. In a draft gear of the type including a housing having a base wall and a side wall, a portion of which side wall has an internal friction surface for coaction with a friction device mounted within said housing, the combination therewith of spring means interposed between the friction device and the base wall for resisting longitudinal movement of the friction device within the housing, said spring means comprising a first relatively light spring acting directly between the base wall and the friction device, second and third springs telescoped over the first spring and acting in tandem between said base wall and the friction device and in parallel with the first spring, said second spring being relatively light and the third spring relatively heavy, and means for de-activating the second spring after a predetermined preliminary travel of the gear, whereby the gear is characterized by soft action for said preliminary travel with the first and second relatively light springs taking substantially all of the load, and relatively stiff action after said preliminary travel with the first and third springs taking such load, said de-activating means including spaced followers, one bearing on the friction device and furnishing a seat for the first and second springs, and the other acting as a bearing surface between juxtaposed ends of the second and third springs, and stop means on one of said followers for limiting movement of the followers toward each other after a given preliminary travel of the gear.

2. In a draft gear of the type including a housing having a base wall and a side wall, a portion of which side wall has an internal friction surface for coaction with a friction device mounted within said housing, the combination therewith of spring means interposed between the friction device and the base wall for resisting longitudinal movement of the friction device within the housing, said spring means comprising a first relatively light spring acting directly between the base wall and the friction device, second and third springs telescoped over the first.

spring and acting in tandem between said base wall and the friction device and in parallel with the first spring, said second spring being relatively light and the third spring relatively heavy, and means for de-activating the second spring after a predetermined preliminary travel of the gear, whereby the gear is characterized by soft action for said preliminary travel with the first and second relatively light springs taking substantially all of the load, and relatively stiff action after said preliminary travel with the first and third springs taking such load, said de-activating means including a cup-shaped follower resting on the friction device and internally receiving the first and second spring, and a ledge on the follower spaced from the third spring when the gear is at rest and furnishing a seat therefor when the second spring has been compressed by an amount corresponding to said preliminary travel.

3. A draft gear as set forth in claim 2 in which a central locating bolt passes through the friction device, the spring means, and the base wall of the housing for holding the gear in assembled relation.

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