HIGH CAPACITY DRAFT GEAR

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This application is filed as a continuation-in-part of my copending application, Serial No. 625,267, filed November 30, 1956, now abandoned the disclosure of which is hereby specifically incorporated by reference.

This invention relates to draft gears for railroad cars and has for its principal object to provide a long travel, high-capacity gear that may be employed in the newly contemplated longer draft gear pockets in connection with the usual types of draft gear attachments to achieve increased capacity over longer travel and thereby maintain reaction pressures on the car within acceptable limits.

Recent freight yard switching practice has enormously increased the energy to be absorbed in buff to such an extent that a longer draft gear pocket is now provided in new freight car construction to permit draft gear capacities to be increased over a longer gear travel. However, the cross-sectional size of the pocket has not been correspondingly enlarged and new problems of maintaining columnar stability in draft gear construction have arisen.

Generally speaking the invention utilizes a friction cushioning element in tandem with a coil spring cushioning element and longer gear travel is accommodated with a conventional type of coil spring cushioning element by utilizing a guide stem that is movable with the follower for the coil spring element to cooperate with the spring element and give it necessary columnar stability during compression. During release, the coil spring aligns the guide stem, which cooperates with an intermediate follower for preventing tipping of this follower, thereby avoiding binding or sticking of the gear. Additional capacity is achieved through longer travel and through the use of corner coil springs mounted in individual spring chambers that extend parallel to the main coil spring chamber. The action of the friction system throughout the gear closure absorbs sufficient energy to maintain reaction pressures on the car within required limits.

Further objects and advantages of the invention will appear as the description is read in connection with the accompanying drawings, in which:

Fig. 1 is a horizontal section through familiar parts of a freight car showing the draft gear mounted in a draft gear pocket in association with the draft gear attaching devices;

Fig. 2 is a vertical section through the same;

Fig. 3 is an enlarged horizontal section through a draft gear of increased capacity and travel made according to the invention with the draft gear being shown in full release;

Fig. 4 is a vertical section along the medial line of the draft gear in full release;

Fig. 5 is a front end view of the draft gear;

Fig. 6 and Fig. 7 are vertical sections taken respectively along the lines 6—6 and 7—7 of Fig. 3;

Fig. 8 is a perspective view of the draft gear housing;

Fig. 9 is a perspective view of the friction plates and wedge shoes;

Fig. 10 is a perspective view of the central plunger;

Fig. 11 is a perspective view of the intermediate follower and wedge member;

Fig. 12 is a perspective view of the guide stem;

Fig. 13 is a perspective view of an auxiliary spring seat;

Fig. 14 is a capacity drop test curve for the gear;

Fig. 15 is a fragmentary horizontal section illustrating an alternative constructional embodiment of a draft gear in accordance with this invention;

Fig. 16 is an enlarged horizontal section illustrating still a further and preferred constructional embodiment of a draft gear made in accordance with this invention;

Fig. 17 is a perspective view of the one-piece intermediate follower and guide stem structure of the embodiment of Fig. 16; and

Figs. 18 and 19 are actual test curves for the embodiment of the gear shown in Fig. 16.

But these drawings and the corresponding description are for the purpose of illustrative disclosure only, and are not intended to impose unnecessary limitations on the claims.

In Figs. 1 and 2 there are shown center sills 10, front and rear draft gear lugs 11 and 12 respectively, a vertical yoke 13 connected to a coupler shank 14 by a draft key 15, in the positons they assume in full release, with a coupler horn 16 spaced from a striking plate 17 and with a front follower 18 within the yoke 13 and against the front lugs 11, all substantially in accord with conventional practice. The coupler carrier iron is shown at 19 and the draft gear carrier iron are shown at 20, there being two required due to the length of the draft pocket.

As illustrated in Fig. 2, the draft pocket is 36 in length in accordance with recently revised specifications of the Association of American Railroads. The present gear when in its full release condition is 33¾″ long and accommodates a nominal gear closure travel of 4½″. In this connection it will be noted that the coupler horn 16 is spaced a full 5″ in front of the striking plate 17. This 4½″ travel represents a significant increase over the former maximum travel of 2¾″ and makes it possible to greatly increase draft gear capacity for better handling of the high energy buffing shocks so common in present day freight yard switching practice.

The present draft gear, generally designated as 21, includes a housing 22 having a rear chamber 23 for a spring cushioning mechanism, generally designated as 24, and a front chamber 25 for a friction cushioning mechanism, generally designated as 26, with the front chamber being in open communication with the rear chamber and having an opening 27 through the front of the housing.

The draft gear housing 22 (Figs. 6, 7 and 8) is an oblong, rectangular, hollow steel casting having top, bottom and side walls designated respectively 28, 29 and 30, with the portions of the top and bottom walls that define the rear chamber each being formed with a pair of laterally spaced apart, parallel, longitudinally extending ribs 31 and 32. The ribs 31 and 32 partially define a main spring chamber in which is mounted a conventional triple-coil spring arrangement consisting of helical springs 34, 35 and 36 which are adapted to be compressed against the rear wall 37 of the housing. In addition, the ribs 31 partially define an auxiliary spring chamber, the top and bottom portions of which receive individual corner coil springs 38, while the ribs 32 partially define a complementary auxiliary spring chamber, the top and bottom portions of which receive individual corner coil springs 39. The auxiliary spring chambers are spaced apart laterally and extend parallel to the main spring chamber on opposite sides thereof. The corner
coil springs are also adapted to be compressed against the rear wall 37. An intermediate follower and wedge member 40 (Fig. 11) is also incorporated with the springing mechanism in the rear chamber and includes a base plate 41 that provides a spring seat for the triple-coil spring arrangement while auxiliary springs 42 (Fig. 13) are disposed in the auxiliary spring chambers between the corner springs and the base plate 41. As shown, each of the auxiliary spring seats cooperate with two corner springs; and while this arrangement takes advantage of the guiding action of the ribs 31 and 32 and better synchronizes the operation of the parallel corner spring elements, it is recognized that individual auxiliary corner spring seats can be provided for each corner spring.

In the front chamber 25 of the housing and forwardly of the base plate 41 is the friction mechanism 26 including groups of intercalated plates, of which 44 and 45 are stationary and 46 is movable. Between the stationary plate 45 of each group are a pair of laterally spaced apart wedge shoes 47 having oppositely outwardly facing surfaces 48 cooperating with the inwardly facing friction surfaces 49 of the stationary plates 45. The wedge shoes 47 have forward wedge surfaces 50 cooperating with similar wedge surfaces 51 on a central plunger 52 and a rearward wedge surfaces 53 cooperating with like surfaces 54 formed at the forward end of a chamfered box-shaped casting 55 that projects forwardly from base plate 41. The wedge surfaces 54 are shown as being carried integral with the intermediate follower 40 and while this is preferred, it is permissible for these parts to be separate.

The box-shaped casting 55 includes longitudinal reinforcing ribs 57 that define a central guiding chamber that is open at both ends with its forward opening 58 being coaxial with, but somewhat larger than, its rearward opening 59.

A stepped tubular guide stem 60 (Fig. 12), of preferably cylindrical form is disposed within the guide chamber with its larger front end portion 61 in guiding cooperation with the ribs 57 and with its smaller rear end portion 62 projecting through the opening 59 in base plate 41 and telescoped within the central coil spring 36. The guide stem includes an intermediate transverse wall 63 that bears against the marginal wall portions surrounding opening 59. A minimum design clearance is provided between the rear portion 62 of the stem and coil spring 36 that normally avoids contact therebetween. There is a positive guiding action between the ribs 57 of the chambered casting 55 and the stem 60 that normally maintains the stem in properly centered axial relationship with the draft gear housing such that the stem resists any tendency for the central coil spring 36 to deflect laterally. In this connection it may also be noted that ribs 31 and 32 in the rear chamber provide a similar stabilizing influence on the outer coil spring 34. Thus columnar stability is achieved.

The central plunger 52 includes a pair of vertically spaced, rearwardly extending, parallel arms 64 that are bridged by a transverse wall 65 which forms a spring seat 66 for one end of a coil spring 67, the other end of which seats against the transverse wall 63 of the guide stem 60. The spring 67 thus reacts between the coil spring cushioning mechanism 23 and the plunger 52 to constantly urge the plunger 52 toward its release position.

Assembly

In assembling the gear auxiliary spring seats 42 and the associated corner springs 38 and 39 are first located in place within the gear and then the triple-coil springs and intermediate follower and wedge member 40 are inserted through the front end of the housing. To facilitate assembly, the housing 22 (Fig. 8) is provided with openings 68 through which assembly pins may be inserted for engaging the intermediate follower and wedge member 40 after suitable compression of the coil spring cushioning mechanism, and this gives ample clearance for assembling the friction parts. While the corner spring seats can be provided for each corner spring.

Stationary plates 44 are held by vertical ribs 70 and 71 formed on the side walls 30 of the housing and stationary plates 45 are held by horizontal ribs 72 and 73 carried by the top and bottom walls of the housing.

In order to shorten the gear temporarily for insertion into the draft gear pocket, the projections 69 are provided with pointed forward ends 74. After a few normal operations of the gear these pointed ends cut into the housing and allow full release of the gear between the lugs 11 and 12.

Operation

In operation the buffing shock is transmitted from the coupler 14 through the front follower 18 to the central plunger 52, forcing it to the right as viewed in Figs. 3 and 4, causing it to act through the wedge shoes 47 and the chambered casting 55 to transmit the travel to the intermediate follower plate 41 and compress all of the coil spring cushioning elements. These parts will furnish sufficient cushioning for light buffing shocks. After suitable travel, however, on the order of 3/4", the follower will come against the outer ends of the movable plates 46 introducing energy-absorbing friction between the movable plates 46 and the stationary plates 44 and 45 which have been pressed together by the action of the wedge shoes 47. As this action continues, the pressure between the adjacent surfaces of the intercalated plates has been enormously increased due to the fact that the wedge shoes are loaded against the cushioning mechanism 23. The energy absorption and dissipation through friction and compression of the cushioning mechanism continues until the gear is closed.

With the additional travel afforded by the longer draft pocket construction during all of which the friction system is active and is increasing in effectiveness as the gear closes, the present gear offers a huge increase in capacity over all known gears and as may be seen from the characteristic curve shown in Fig. 14, the capacity of this gear is on the order of 80,000 foot pounds. It is important to note that the action of the friction system permits this to be accomplished without exceeding a 500,000 pound reaction pressure on the car sills and thus these high energy shocks are readily handled without upsetting the coupler shank. The curve shown in Fig. 14 is based on the standard A.A.R. capacity drop-test and the cross-hatched area 75 between the closure curve 76 and the recoil curve 77 represents the amount of energy absorption.

In cross section the draft pocket remains at the usual 125" by 9" dimensions and since the 33 1/2" draft gear of the present invention must be arranged within these limits, the cross-sectional sizes of the coil springs need to be retained substantially the same as in the past and yet these springs are of far greater length and provide greatly increased travel.

Under these circumstances and in view of the high shocks to which they are subjected, the problem of columnar stability of the coil springs is an important one. According to the present invention a maximum of cushioning capacity is obtained by means of the ribbed housing constructions which permit corner springs to be accommodated and guided during their expansion and compression. The guiding action is provided by the cooperation between the ribs 31 and 32 and the corner springs themselves and even more importantly by the
cooperation between these ribs and the auxiliary spring seats for the corner springs. The ribs 31 and 32 also provide a guiding action to the outer spring 34 of the triple-coil group and, in conjunction with the action of the guide stem 60, provide necessary stability to the triple-coil group during compression of the gear. The guide stem in turn cooperates with the chambered casting 55 of the intermediate follower 40 to insure that the guide stem is properly centered. Finally the guide stem itself forms a seat for release spring 67.

During release of the gear the coil springs maintain the alignment of the guide stem, which, in turn, prevents tipping of the intermediate follower. It will be appreciated that the tip or cock position of the auxiliary spring seats for the corner springs with identical release characteristics holds out a continuing possibility of the follower plate’s becoming cocked or tipped during release of the gear such as could result in binding or sticking of the gear.

**alternative embodiments**

The intermediate follower and guide stem structure may be variously embodied within the scope of the teachings of this invention, and two alternative embodiments of this structure are shown in Figs. 15 and 16, respectively. The general arrangement of these alternative embodiments is similar to that previously described, and corresponding parts are assigned identical reference characters for convenience of disclosure.

In the alternative embodiment shown in the fragmentary horizontal sectional view of Fig. 15, the guide stem 60 may be essentially identical in form to that of the previously described embodiment; however, the rear surfaced portion 61 of the front end portion 58 now functions as a spring seat for the innermost coil spring 36 of the spring cushioning assembly 24. This innermost coil spring 36 therefore urges the guide stem towards the open front end 58 of the box-shaped casting 55, which is formed with internal shoulders 55S for abutting coaction with the guide stem. Once again, the guide stem cooperates with the internal ribs of the box-shaped casting for maintaining the stem and casting in properly centered relation within the draft gear housing such that the stem normally resists any tendency for the center coil spring 36 to deflect laterally under compression loading. Again, there is a further important feature derived from this intermediate follower and guide structure in that the center coil spring 36 acts upon the stem portion 62 during release of the gear to cause the stem portion 61 to remain centered and, by its interaction with the chambering 55, to prevent any tendency for the Intermediate follower to cock about a transverse axis.

The embodiment of Fig. 16 illustrates the preferred commercially tested and approved structure of the present invention, and it employs a one-piece intermediate follower and guide stem structure 140 (see Fig. 17) having a transversely arranged base plate 141 providing a spring seat for the coils 134 and 135 of a double-coil main spring cushioning element. Integ rally connected to the base plate is a rearwardly extending stem portion 162 and a forwardly extending, box-shaped, chambered casting 155. The corner regions of the base plate are again arranged to abut the auxiliary spring seats 42 for the sets of corner springs 38 and 39. The base plate also extends inwardly of the periphery of the chambered casting 155 to provide a spring seat for the release spring 67. The box-shaped chambered casting 155 is provided with lengthwise extending internal reinforcement walls 157, and at the bottom, there is a cast L-shaped wedge-like surfaces 154, with the casting opening through these wedge surfaces as indicated at 158 to accommodate the release spring 67.

It will be apparent that the rearwardly projecting guide stem 162 of this embodiment is of increased diameter when compared with the foregoing arrangements so that only a double-coil main spring cushioning element may be accommodated within the cross-sectional dimensions of the gear housing 22. This stem extends a distance of approximately six inches from the transverse plane of the base plate 141 and is provided with inward end shoulders 162S forming a seat for an additional spring 136 that is arranged to act between the rear housing wall 37 and the end of the stem 162. This additional spring 136 makes effective use of the available space behind the stem and gives a measure of added capacity to the gear.

The one-piece follower and guide structure offers the advantages of inherently greater strength and a more secure and reliable guiding action, and it functions in essentially the same fashion as the two-piece follower and guide structures of the embodiments of Figs. 3 and 15.

During compression of the gear, the guide stem 162 cooperates with the innermost coil spring 135 to insure desired columnar stability of this spring. During release, the spring 135 acts upon the stem 162 to maintain the longitudinal alignment of the follower and guide structure 140 and resist any tendency for the follower to become cocked or tipped, a condition which could lead to binding or sticking of the gear. The remaining components, such as the friction system, the release spring 67, and the corner springs and associated auxiliary seats, function in the same manner as described previously.

The performance curves for the gear of Fig. 16 are shown in Figs. 18 and 19. Fig. 18 is a capacity curve and the shaded portion 175 under the curve 176 is a measure of the energy absorbed during closure of the gear. Fig. 19 shows a curve of the reaction force to which the car sill is subjected, together with the gear capacity curve for a range of gear closure travel, and the dot-dash lines on this curve illustrate that in tests made in accordance with the A.A.R. specification M-901C-56, the gear of Fig. 16 tested to a capacity of 77,820 foot pounds over a 4.59’ gear closure travel with a reaction force to the car sills of only 447,000 pounds.

Thus it will be seen that the objects of the present invention have been accomplished in that a high capacity gear characterized by long travel and the development of a minimum reaction pressure has been provided. The friction system is of such a nature that, when acting over a long travel, it continuously absorbs greater percentages of the applied energy as the gear closes. The long travel is accommodated without danger of columnar instability by reason of the continuously effective guiding action that is applied to the coil springs.

I claim:

1. In a draft gear; a housing having a rear chamber and a front chamber in open communication with the rear chamber and open at its front end, said housing carrying laterally spaced opposed friction surfaces in said front chamber; a main spring cushioning element disposed centrally in said rear chamber and a plurality of corner spring cushioning elements spaced about and extending alongside said main element; auxiliary spring seats forwardly of said corner spring elements on opposite sides of said main spring element; an intermediate follower member overlying and disposed forwardly of and in abutting relation to said auxiliary spring seats and said main cushioning element and movable with said spring seats relative to said housing to compress or release all of said cushioning elements simultaneously; and an energy absorbing friction cushioning element mounted in said front chamber to react against said intermediate follower and including a thrust wedge acting between laterally spaced friction surfaces to urge the said friction surfaces outwardly into cooperation with said opposed friction surfaces during compression of said gear.

2. In a draft gear; a housing having a rear chamber of a generally rectangular cross section defined by top, bottom and side walls with longitudinally extending internal ribs carried by opposite sides of said walls and partially
defining a main cylindrical spring chamber and a plurality of corner spring chambers, said housing having a front chamber in open communication with the rear chamber and opened at its front end for mounting laterally spaced opposed friction surfaces in said front chamber; a main spring cushioning element and a plurality of corner spring cushioning elements disposed in side-by-side relation in said spring chambers; an intermediate follower member overlying and disposed forwardly of all of said cushioning elements and movable relative to said housing to compress or release all of said cushioning elements simultaneously; and an energy absorbing friction cushioning element mounted in said front chamber to react against said intermediate follower and including a thrust wedge acting between laterally spaced friction surfaces to urge said last mentioned friction surfaces outwardly into cooperation with said opposed friction surfaces during compression of said gear.

3. In a draft gear; a housing having a rear chamber and a plurality of corner spring chambers, said housing having a front chamber in open communication with the rear chamber and opened at its front end for mounting laterally spaced opposed friction surfaces in said front chamber; a main spring cushioning element in said main spring chamber and a pair of corner spring cushioning elements disposed in each of said lateral chambers; an auxiliary spring seat member for each of said lateral spring chambers forwardly of the corner spring elements therein and overlying both of the same; an intermediate follower member overlying and disposed forwardly of all of said cushioning elements and movable relative to said housing to compress or release all of said cushioning elements simultaneously; and an energy absorbing friction cushioning element mounted in said front chamber to react against said intermediate follower and including a thrust wedge acting between laterally spaced friction surfaces to urge said last mentioned friction surfaces outwardly into cooperation with said opposed friction surfaces during compression of said gear.

4. In a draft gear; a housing having a rear chamber and a front chamber in open communication therewith and opened at the front, said housing carrying laterally spaced opposed friction surfaces in said front chamber, coil spring cushioning means in the rear chamber, an intermediate follower forwardly of said coil spring means and comprising a base plate having a central opening and a forwardly projecting box shaped member carrying inner spring means; said guide said, said housing carried laterally spaced opposed friction surfaces in said front chamber, a main spring cushioning element and a plurality of corner spring cushioning elements disposed in side-by-side relation in said spring chambers; an intermediate follower member overlying and disposed forwardly of all of said cushioning elements and movable relative to said housing to compress or release all of said cushioning elements simultaneously; and an energy absorbing friction cushioning element mounted in said front chamber to react against said intermediate follower and including a thrust wedge acting between laterally spaced friction surfaces to urge said last mentioned friction surfaces outwardly into cooperation with said opposed friction surfaces during compression of said gear, and a release spring reacting between said spring seat and said transverse wall for continuously urging the same apart to release said friction cushioning element after compression of said gear.

5. In a draft gear; a housing having a rear chamber and a plurality of corner spring chambers, said housing having a front chamber in open communication therewith and opened at the front, said housing carrying laterally spaced opposed friction surfaces in said front chamber, coil spring cushioning means in the rear chamber, an intermediate follower forwardly of said coil spring means and comprising a base plate having a central opening and a forwardly projecting box shaped member carrying inner spring means; said guide said, said housing carried laterally spaced opposed friction surfaces in said front chamber, a main spring cushioning element and a plurality of corner spring cushioning elements disposed in side-by-side relation in said spring chambers; an intermediate follower member overlying and disposed forwardly of all of said cushioning elements and movable relative to said housing to compress or release all of said cushioning elements simultaneously; and an energy absorbing friction cushioning element mounted in said front chamber to react against said intermediate follower and including a thrust wedge acting between laterally spaced friction surfaces to urge said last mentioned friction surfaces outwardly into cooperation with said opposed friction surfaces during compression of said gear, and a release spring reacting between said spring seat and said transverse wall for continuously urging the same apart to release said friction cushioning element after compression of the gear.
9. In a draft gear: a housing having a rear chamber and a front chamber in open communication therewith and open at the front, said housing carrying a plurality of transversely spaced inwardly facing friction surfaces in said front chamber, a main spring cushioning element disposed centrally in the rear chamber and a plurality of auxiliary spring cushioning elements spaced about and extending alongside said main element, intermediate follower structure disposed forwardly of and overlying all of said spring elements and including a transversely extending follower plate and a rearwardly extending guide stem movably therewith lengthwise in said housing, said guide stem and said main spring cushioning element being disposed to cooperably resist tipping of said plate, an energy-absorbing friction-cushioning element mounted in the front chamber in tandem relation with said main spring cushioning element disposed forwardly of and overlying said main spring element and said auxiliary spring seat members and including a transversely extending follower plate and a rearwardly extending guide stem movably therewith lengthwise in said housing, said guide stem and said main spring cushioning element being disposed to cooperably resist tipping of said plate, an energy-absorbing friction-cushioning element mounted in said front chamber to react against said follower structure and including a plurality of transversely spaced wedge shoes having outwardly facing friction surfaces and a thrust wedge actuating between said shoes to urge said outwardly facing friction surfaces into cooperation with said inwardly facing friction surfaces during compression of said gear, and a release spring extending between said intermediate follower structure and thrust wedge for continuously urging the same apart to release said friction cushioning element after compression of said gear.

10. The arrangement of claim 9 wherein said main spring element comprises a plurality of concentric coil springs and said guide stem is in telescoping relation within the inner coil spring.

11. In a draft gear: a housing having a rear chamber of a generally rectangular cross section defined by top, bottom and side walls with longitudinally extending internal ribs carried by opposite ones of said walls and partially defining a main spring chamber and a plurality of corner spring chambers, said housing having a front chamber in open communication with the rear chamber and including its front end, said housing having a plurality of transversely spaced inwardly facing friction surfaces in said front chamber; a main spring cushioning element and a plurality of corner spring cushioning elements disposed in side-by-side relation in said spring chambers; intermediate follower structure disposed forwardly of and overlying all of said spring elements and including a transversely extending follower plate and a rearwardly extending guide stem movably therewith lengthwise in said housing, said guide stem extending into telescopic relationship with said annular spring cushioning element and cooperating therewith to react against said plate, an energy-absorbing friction-cushioning element mounted in said front chamber to react against said follower structure and including a plurality of transversely spaced wedge shoes having outwardly facing friction surfaces and a thrust wedge actuating between said shoes to urge said outwardly facing friction surfaces into cooperation with said inwardly facing friction surfaces during compression of said gear, and a release spring extending between said intermediate follower structure and thrust wedge for continuously urging the same apart to release said friction cushioning element after compression of said gear.

12. In a draft gear: a housing having a rear chamber of a generally rectangular cross section defined by top, bottom and side walls with longitudinally extending internal ribs carried in opposed relationship by said top and bottom walls and partially defining a main spring chamber and lateral spring chambers on opposite sides of and alongside said main spring chamber, said housing having a front chamber in open communication with the rear chamber and open at its front end, said housing carrying a plurality of transversely spaced inwardly facing friction surfaces in said front chamber; a main spring cushioning element in said main spring chamber and a pair of corner spring cushioning elements disposed in each of said lateral chambers; an auxiliary spring seat member for each of said lateral spring chambers for cooperatively resisting tipping of said plate; an energy-absorbing friction-cushioning element mounted in said main spring chamber and in said auxiliary spring chamber each of said lateral chambers; an auxiliary spring seat member for each of said lateral spring chambers for cooperatively resisting tipping of said plate; an energy-absorbing friction-cushioning element mounted in each of said auxiliary spring chambers; an energy-absorbing friction-cushioning element mounted in said auxiliary spring chamber each of said lateral chambers; an auxiliary spring seat member for each of said lateral spring chambers for cooperatively resisting tipping of said plate; an energy-absorbing friction-cushioning element mounted in each of said auxiliary spring chambers; and a release spring extending between said intermediate follower structure and thrust wedge for continuously urging the same apart to release said friction cushioning element after compression of said gear.
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1. Intermediate follower structure located between said friction-cushioning element and said spring cushions said elements and including a transversely extending follower plate overlying all of said elements, a box-shaped portion rigid with and extending forwardly of said plate to provide forward wedge faces, a guide stem interlocked with the plate to resist lateral movement relative thereto and extending rearwardly of said plate, said stem being moveable lengthwise from said plate and said box-shaped portion and disposed in adjacent telescoping relation with said main spring cushioning element to cooperatively resisting tipping of said plate, said friction mechanism including a front wedge spaced lengthwise from and facing said box-shaped portion, laterally spaced wedge shoes positioned between and cooperating with said front wedge and the wedge faces of said box-shaped portion and having outwardly facing friction surfaces engaging with said opposed friction surfaces in said housing during compression of said gear, and a release spring extending between said intermediate follower structure and front wedge for continuously urging the same apart to release said friction-cushioning element after compression of said gear.

15. The arrangement of claim 14 wherein a group of interlaced stationary and movable friction plates is disposed within the front chamber at each side thereof to provide said opposed frictional surfaces, with the moveable plates of said groups projecting longitudinally outwardly of said housing for external actuation during a portion of the compression travel of said gear.

16. Intermediate follower structure for a draft gear, said follower structure comprising a transverse base plate portion having oppositely lengthwise directed front and rear surfaces with said rear surface constituting a spring seat, a box-shaped portion integral with and extending forwardly of said front surface and providing cooperating wedge faces at its forward end, and a guide stem integral with and extending rearwardly of said rear surface from a point centrally of said spring seat.

17. In a draft gear: a housing having a rear chamber and a front chamber in open communication therewith and open at the front, said housing carrying a plurality of transversely spaced inwardly facing friction surfaces in said front chamber, spring cushioning means in the rear chamber, intermediate follower structure disposed forwardly of and overlying said spring means and including a transversely extending follower plate, a box-shaped portion rigid with and extending forwardly of said plate and providing forward wedge faces, and a rearwardly extending guide stem rigid with said plate and disposed in adjacent telescoping relation with said spring cushioning means to cooperatively resist tipping of said plate, and an energy-absorbing friction-cushioning element mounted in said front chamber to react against said intermediate follower structure and including a plurality of transversely spaced wedge shoes engageable with said wedge faces and having outwardly facing friction, surfaces, and a thrust wedge acting between said shoes and cooperating with said wedge faces to urge said outwardly facing friction surfaces of said shoes into cooperation with said inwardly facing friction surfaces during compression of said gear.

18. In a draft gear: a housing having a rear chamber and a front chamber in open communication therewith and open at the front, said housing carrying a plurality of transversely spaced inwardly facing friction surfaces in said front chamber, spring cushioning means in the rear chamber, intermediate follower structure disposed forwardly of and overlying said spring means and including a transversely extending follower plate having a central opening and a forwardly projecting box-shaped portion rigid with the plate and providing forward wedge faces, said box-shaped portion carrying inner lengthwise guide surfaces and internal transverse shoulders defining a passageway open at the rear and partially closed at its front by said shoulders, a guide member in said passageway cooperating with said guide surfaces to prevent lateral movement relative thereto and abutting said front portions of said box-shaped portion and including a plurality of transversely spaced wedge shoes engageable with said wedge faces and having outwardly facing friction surfaces, and a thrust wedge acting between said shoes and cooperating with said wedge faces to urge said outwardly facing friction surfaces of said shoes into cooperation with said inwardly facing friction surfaces during compression of said gear, and a release spring extending between said guide member and thrust wedge for continuously urging the same apart to release said friction-cushioning element after compression of the gear.

19. In a draft gear: a housing having a rear chamber and a front chamber in open communication therewith and open at the front, said housing carrying a plurality of transversely spaced friction plates providing transversely inwardly facing friction surfaces extending in rearwardly converging relation in said front chamber, said housing having an integral rear wall; concentric multiple-coil spring-cushioning means in the rear chamber and seating against said rear wall; an energy-absorbing friction-cushioning element mounted in the front chamber and including a plurality of transversely spaced wedge shoes having transversely outwardly facing friction surfaces and a plunger including a thrust wedge acting between said transversely outwardly facing friction surfaces into cooperation with said transversely inwardly facing friction surfaces during compression of the gear; said plunger including a longitudinally rearwardly offset and rearwardly facing spring seat; intermediate follower structure having a transversely extending follower plate disposed forwardly of said concentric multiple-coil spring-cushioning means to overlie and provide a seat therefor; a box-shaped portion rigid with and extending forwardly of said follower plate and providing corresponding wedge faces engaging complementary wedge faces of said wedge shoes; and a rearwardly extending guide stem interlocked with said follower plate to resist transverse shifting or tipping movement relative thereto and movable with the follower plate lengthwise in the housing; said stem extending in adjacent telescoping relation with the innermost one of said concentric multiple-coil spring-cushioning means to cooperatively resist tipping of said follower plate and longitudinal release spring means disposed between said intermediate follower structure and said rearwardly facing spring seat to act through said intermediate follower structure and said concentric multiple-coil spring-cushioning means to react between said integral rear wall of the housing and said rearwardly facing spring seat after compression of the gear.

20. In a draft gear: a housing having a rear chamber and a front chamber in open communication therewith and open at the front, said housing carrying a plurality of transversely spaced friction plates providing transversely inwardly facing friction surfaces extending in rearwardly converging relation in said front chamber, said housing having an integral rear wall; concentric multiple-coil spring-cushioning means in the rear chamber and seating against said rear wall; and a plurality of corner spring cushioning elements spaced about and extending along said rear wall; auxiliary spring seats forwardly of said corner spring elements on opposite sides of said multiple-coil spring-cushioning means; an energy-absorbing friction-cushioning element mounted in the front chamber and including a plurality of trans-
versely spaced wedge shoes having transversely outwardly facing friction surfaces and a plunger including a thrust wedge acting between said shoes to urge said transversely outwardly facing friction surfaces into cooperation with said transversely inwardly facing friction surfaces during compression of the gear; said plunger including a longitudinally rearwardly offset and rearwardly facing spring seat; intermediate follower structure having a transversely extending follower plate disposed forwardly of said auxiliary spring seats and said concentric multiple-coil spring-cushioning means to overlie and provide a seat therefor, a box-shaped portion rigid with and extending forwardly of said follower plate and providing corresponding wedge faces engaging complemental wedge faces on said wedge shoes, and a rearwardly extending guide stem interlocked with the follower plate to resist transverse shifting or tipping movement relative thereto and movable with the follower plate lengthwise in the housing, said stem extending in adjacent telescoping relation with the innermost one of said concentric multiple-coil spring-cushioning means to cooperably resist tipping of said follower plate; and longitudinal release spring means disposed between said intermediate follower structure and said rearwardly facing spring seat to act through said intermediate follower structure and said concentric multiple-coil spring-cushioning means to react between said integral rear wall of the housing and said rearwardly facing spring seat after compression of the gear.

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