Aug. 30, 1932. C. J. HOLLAND 1,874,531

FRICTION DRAFT GEAR

Filed July 14, 1926 4 Sheets-Sheet 1

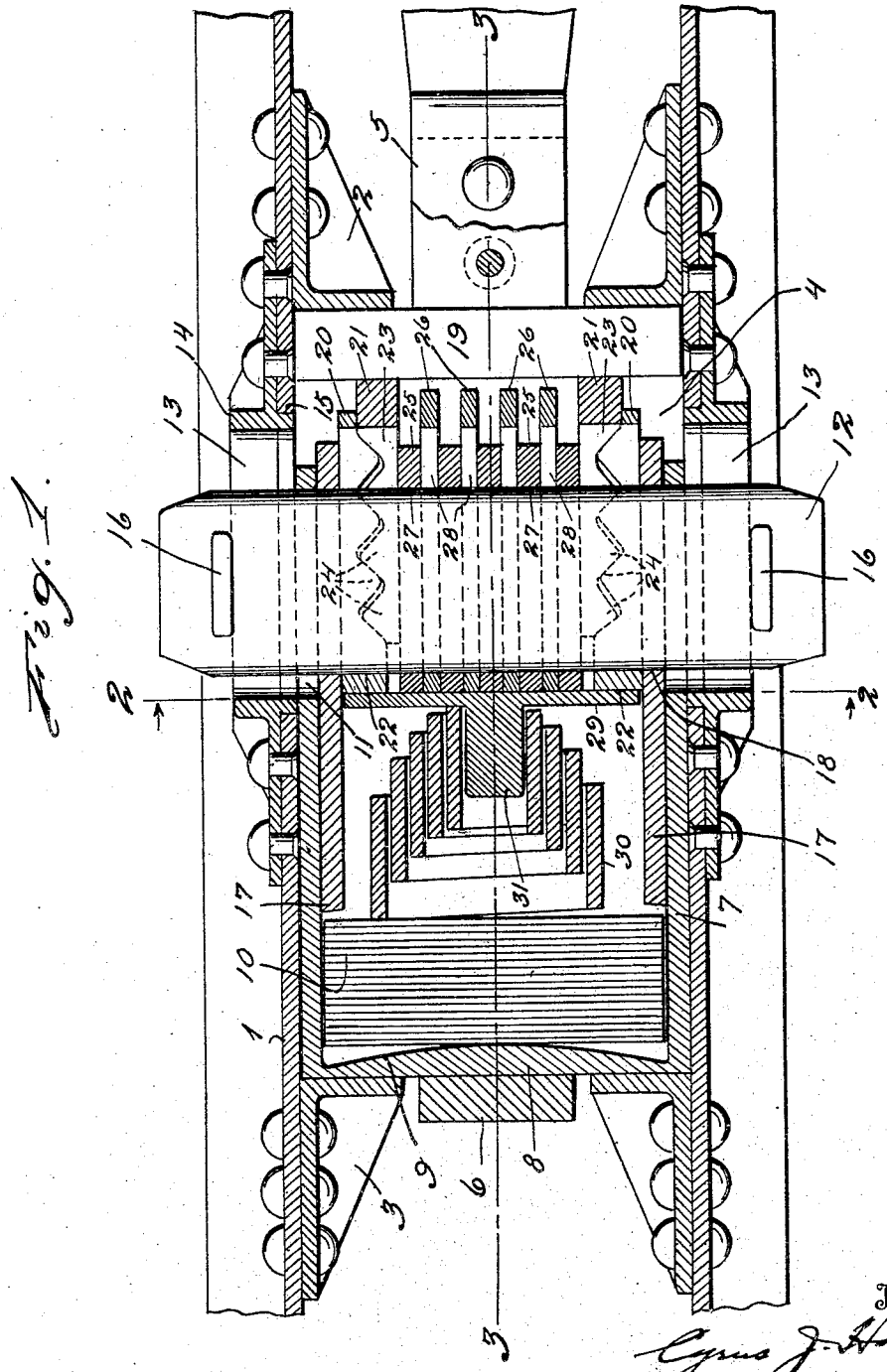


Fig. 1.

Witness
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FRICTION DRAFT GEAR

Filed July 14, 1926 4 Sheets-Sheet 2

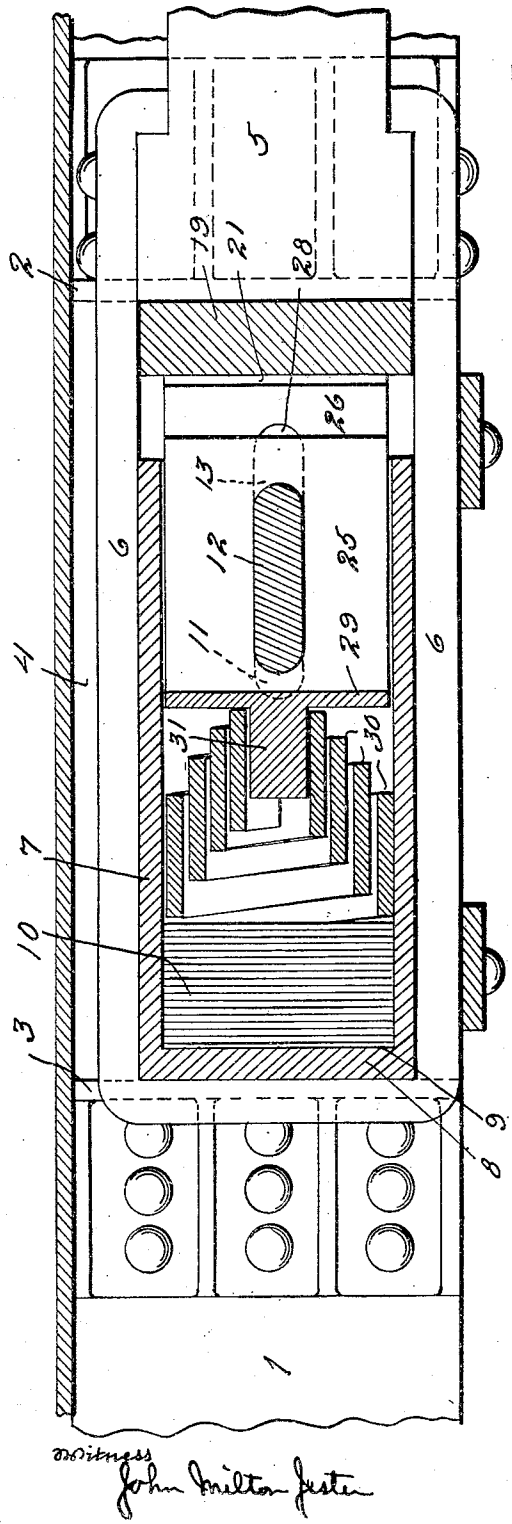


Fig. 3.

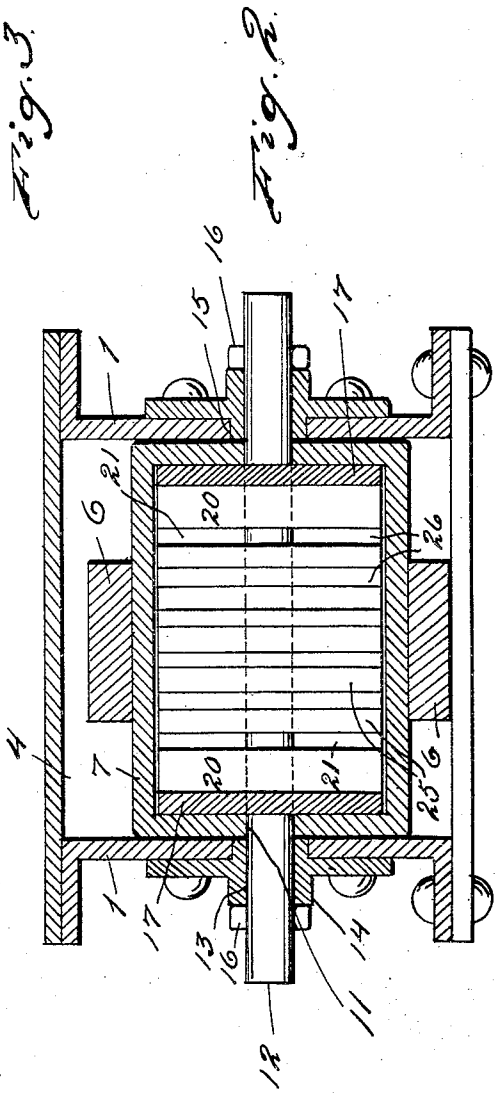


Fig. 2.

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FRICTION DRAFT GEAR

Filed July 14, 1926 4 Sheets-Sheet 3

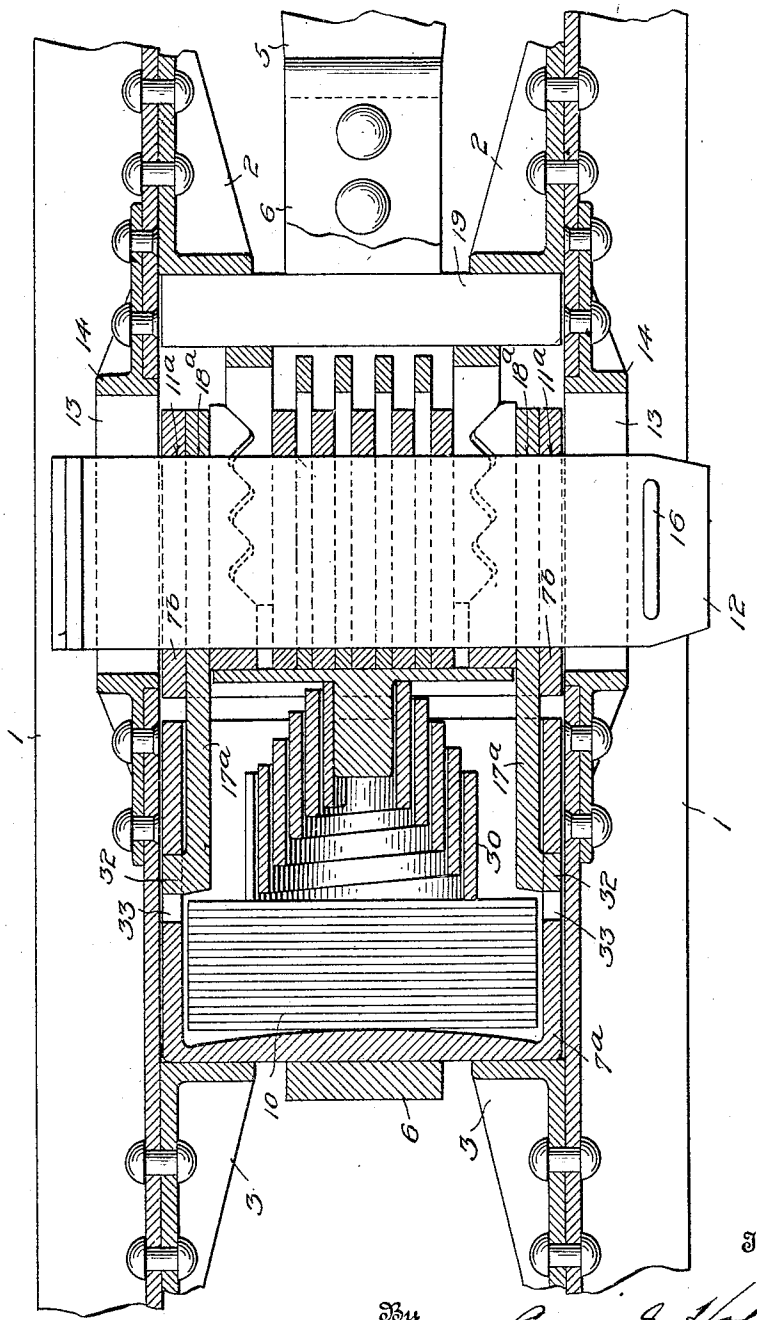


Fig. 4

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FRICTION DRAFT GEAR

Filed July 14, 1926 4 Sheets-Sheet 4

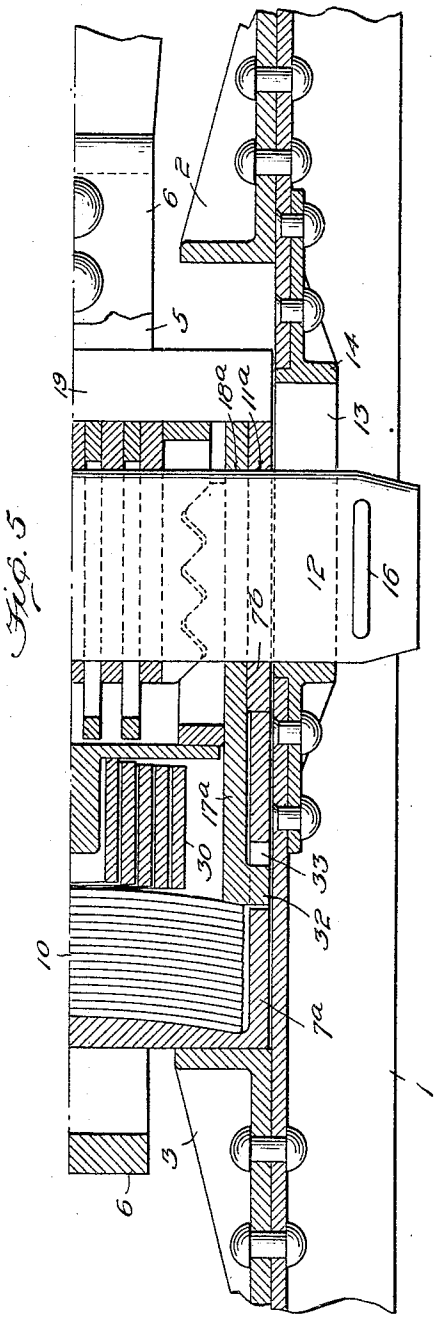


Fig. 5

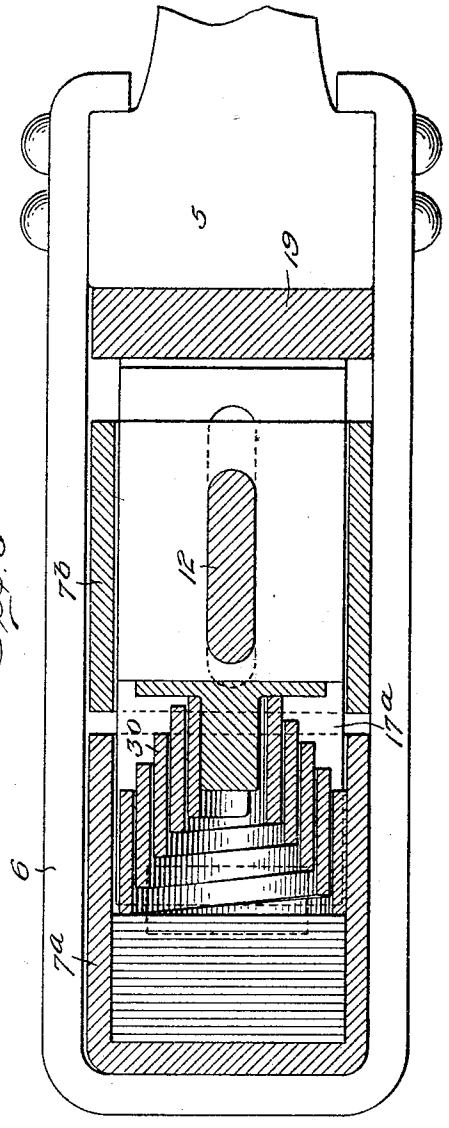


Fig. 6

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UNITED STATES PATENT OFFICE

CYRUS J. HOLLAND, OF CHICAGO, ILLINOIS

FRICTION DRAFT GEAR

Application filed July 14, 1926. Serial No. 122,352.

The invention relates to draft gear for railway cars.

The principal object of my invention, generally considered, is to provide a draft mechanism for railway cars adapted to fit within a standard pocket, said mechanism involving a spring device and a friction device, the spring device preferably having a capacity not less than the usual commercial twin spring draft gear.

Another object of the invention, generally stated, is to provide a draft gear provided with means whereby the first portion of the movement in either direction will be opposed by spring resistance of high capacity, the remainder being resisted by a combination of spring and frictional resistance.

An important object of the invention is to provide a friction draft gear embodying a key which may extend beyond the draft gear so as to operate within slots in the car center sills, the key being adapted to cooperate with said sills to transmit thereto loads in excess of the total capacity of said gear.

A more specific object of the invention is to provide a friction draft gear embodying a plurality of cushioning elements which travel in unison against spring resistance during a part of the movement under either buff or pull, the construction and arrangement being such that in another portion of the movement means will come into play for throwing the friction producing elements into action.

A further object of the invention is to provide a friction draft gear embodying large friction areas so as to reduce the pressure per square inch, thereby avoiding the concentration of strains at local points and reducing wear to the minimum.

A still further object of the invention is the provision of a friction draft gear adapted to be used in a standard gear pocket and embodying a draft key passing through the friction elements and through the center sills of the car, if desired, in which case the arrangement of the key with respect to the slots therefor in the center sills and the slots therefor in the housing will be such that the key will serve as an abutment at the completion of the draft gear travel, thereby avoiding the bringing of undue strains upon the gear housing by distributing the force of the impact.

Another object of the invention is to provide a friction draft gear having a high spring resistance to the initial travel, this resistance continuing throughout the several stages of the frictional resistance which is caused by the stop means and the wedge means coacting with friction elements.

Another object of the invention is to provide a friction draft gear embodying spring means for the initial movement of the gear in either direction, and under buff or pull, combined with friction producing means, the spring means taking up the shocks and jars incident to train movement without bringing the friction producing means into action to thereby greatly reduce the wear on the friction producing means or coacting friction elements.

Another important object of the invention is to provide a friction draft gear in which the initial release movement is effected without frictional resistance to thereby insure a quick and positive release, the arrangement of the parts being such that after the initial release the parts coact frictionally to decrease the recoil shocks without affecting the return of the parts to normal position.

Another important object of the invention is to provide a friction draft gear of high capacity which will have an extremely quick release with low recoil and therefore a high percentage of absorption. This novel feature is accomplished by the high capacity spring means which actuate the initial movement on release after which the friction elements are returned to their normal open position thereby dampening the recoil.

An additional object of the invention is the provision of a gear of this character which consists of but a few parts and which will consequently be comparatively simple and inexpensive to manufacture, easy to install, positive in action, efficient and durable in service, and a general improvement in the art.

With the above and other objects and advantages in view, the invention consists in the details of construction and arrangement

of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a horizontal sectional view taken longitudinally through the center sills of a railway car and showing high capacity friction draft gear applied and in normal position,

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a longitudinal section taken on the line 3—3 of Figure 1,

Figure 4 is a view similar to Figure 1 showing, however, a slightly modified form of construction,

Figure 5 is a transverse horizontal sectional view of the construction shown in Figure 4 showing the position of the parts under full compression,

Figure 6 is a transverse vertical sectional view of the construction shown in Figure 4.

Referring to the drawings and more particularly to Figures 1 to 3 inclusive, I have illustrated a portion of a draft rigging including center sills 1 to the confronting sides of which are secured front and back stops 2 and 3, respectively, which define a pocket 4 within which is mounted the draft gear constituting the present invention, this draft gear cooperating with a coupler butt 5 and yoke 6 secured thereto. Any ordinary or preferred carry-irons may be provided to constitute supporting means for certain other parts.

I have shown the gear as comprising a casing or housing 7 mounted within the pocket 4 and having its rear end 8 closed and its front end open, the inner surface 9 of the closed end being convex and constituting a seat or abutment for a bank of plate or leaf springs 10 preferably arranged as disclosed for a purpose to be described.

The housing 7 is preferably provided on opposite sides with elongated slots 11 in which is located a transversely arranged key 12. The latter also preferably is adapted to enter slots 13 in the cheek plates 14 secured to the outer sides of the center sills, the slots 13 in the cheek plates being adapted to register with the slots 15 in the sills. Any suitable means such as retainers 16 may be provided for preventing longitudinal displacement of the key in either direction laterally of the gear, though it is of course apparent that the key is capable of having limited movement longitudinally of the sills. In order to provide for spring resistance to initial movements of the coupler the slots 11 in the housing are elongated, the preferable arrangement being for the forward edge of the key to engage the forward edge of the slots 11 thus spacing the rear edge of the key a predetermined distance from the rear ends of the slots 11. If desired the slots 11 at their rear end coincide with the rear end of the slots 13 in the cheek plates so that under movement of the key in buffing the adjacent edge of the key will contact the rear end of the slots 11 and 13 simultaneously to limit further movement of the key and ultimately, as will hereinafter be pointed out, to serve as an abutment under full buffing strains to limit the compression of the mechanism and at the same time to distribute overloads to the sills in alinement with the webs thereof.

The means for developing spring resistance to initial movement of the gear under either buff or pull, comprises suitable plate members 17 located within the housing 7 and against the opposite sides thereof, the rear ends of these plates being adapted to bear against the end portions of the forwardmost leaf of the bank 10 of plate or leaf springs, and the forward portions of the plate members being slotted at 18 for the passage of the key 12. Clearly, any rearward movement of the key will result in the application of pressure to the ends of the springs 10 which will consequently flex owing to the convexity of the front surface 9 of the closed end 8 of the housing.

The numeral 19 designates the front follower which is of course engaged by the coupler butt 5 while the yoke 6 has its rear or bight portion engaging the rear end 8 of the housing 7, and this follower is preferably of such size as to engage against the forward or open end of the housing 7 when the entire gear goes solid or when the maximum friction is brought about. Normally, the follower 19 engages against the front stops 2.

Located within the housing and preferably adjacent the plates 17 are pairs of wedge elements 20 and 21, the elements 20 being in contact with the plates 17 and being adapted to move longitudinally thereof. Each of these pairs of elements is slotted as at 22 and 23 for the passage of the key 12, the slots 22 and 23 having their forward edges spaced from said key a distance substantially equal to the total travel of the coupler under either draft or buffing movements. The wedge elements 21 are adapted to move both longitudinally of the key and longitudinally with respect to the housing, that is to say, each of the elements 21 is capable of movement laterally of the housing as well as longitudinally thereof. The forward ends of the wedge elements 21 are preferably adapted to engage the rear face of the front follower 19 while the forward ends of the wedge elements 20 are preferably spaced therefrom a slight distance. The confronting faces of the members 20 and 21 of each pair are formed with interfitting serrations 24 so as to provide inclined surfaces in the form of wedges so that upon relative longitudinal movement of the coupler the wedge elements 20 and 21 of each pair will have a relative lateral movement or separation.

The friction developing means further includes series of interfitting friction plates 25 and 26 arranged in alternation, all of the former being slotted at 27 to fit upon the key, and all of the latter being slotted at 28 to accommodate the key and to have movement transversely thereof when engaged by the follower 19 upon rearward movement thereof.

Disposed to the rear of and normally engaging against the wedge elements 20 and the friction plates 25 and 26 is a rear follower or spring seat 29 which bears against a spring 30 preferably, though not necessarily, of the volute type, the member 29 having a central projection 31 located within the innermost convolution of the spring 30. Obviously, there is no limitation as to these exact details as it is conceivable that more than one spring may be provided and that whatever is used need not be of the volute type. It is intended that the spring 30, or any number that may be used, be placed under a certain amount of initial compression, the exact degree to be determined either by computation or experiment.

The operation of the device is as follows:

Assuming that the parts occupy the position shown in Figure 1 and assuming inward movement of the coupler caused by a buffing action, it will be observed that as these stationary plates 25 are carried by the key 12 there will be no relative sliding movement between the plates 25 and the plates 26, the wedge elements 21 will be forced inwardly and laterally so that the total distance moved will be the distance normally separating the follower 19 from the ends of the plates 26. During this operation of the gear the plates 17 have been forced rearwardly a distance equal to the distance separating the rear edge of the key 12 from the rear edge of the slots 11 and 13, thus causing a compression of the plate spring 10 and a compression of the volute spring 30. If the blow causing the inward movement of the coupler is of greater intensity than the capacity of the spring 10 and of the amount of compression of the volute spring the follower 19 will now cause a relative sliding movement between the plates 26 and the plates 25 which of course have been forced into tight frictional engagement by the movement of the wedges 21 and this movement of the wedges 20, 21 and the plates 26 will continue until the slots at the ends of the wedges 21 engage the edge of the key 12 and at this point the device is so arranged that the extreme edges of the followers will simultaneously engage the outer end of the casing or housing 7. Blows in excess of the combined friction and spring capacity of the gear will then be distributed by metal contact to the rear stop lugs 3 through the casing or housing 7 and to the sills 1 by the engagement of the rear edge of the key 12 with the rear edges of the slots 13. Upon release of the force which has caused an inward movement of the coupler, as above described, the plate springs 10 will now react against the plates 17 to force the same forwardly and to cause the front edge of the key to again contact with the front ends of the slots 11 in the housing 7. This action, as will be observed, is practically a free spring action since the relatively movable friction elements are carried forwardly by the key and the plates 17 without frictional action, the only friction being generated between the plates 17 and the adjacent walls of the housing. The sudden arresting of this recoil movement of the friction elements as a unit by the engagement of the key with the forward ends of the slots 11 tends to release the friction elements from gripping engagement sufficiently to enable the volute spring 30 to force the parts to normal position but the gripping action is sufficient to dampen the recoil.

Under draft movement the operation of the parts is substantially identical with that previously described. The only differences in operation are as follows:

The casing 7 is moved forwardly and follower 19 held stationary. It will be obvious that the initial spring action will be limited by the engagement of the slot 11 with the rear face of the key 12, the plates 17 due to the engagement of the wedges 21 being moved relatively to the casing to again compress the spring 10. Upon a continued forward movement of the coupler the key 12 is moved forwardly carrying with it the plates 25 which now move relatively to the plates 26 which have been brought into contact, under the initial movement, with the follower 19 and the movement of the parts is arrested by the engagement of the forward edge of the key 12 with the forward ends of the slots 13 in the cheek plates.

Referring now to the modified form of construction, the casing comprises a plurality of separated housings 7^a and 7^b, respectively, the housing 7^b corresponding to the rear portion of the casing 7 in Figure 1, the portion 7^a of the housing being adapted to surround the friction elements which are shown as identical with those illustrated in Figures 1 to 3 inclusive. The plates 17^a are, in this modification, provided adjacent their inner ends with outwardly facing lugs or projections 32, each of which is adapted to engage in an elongated slot 33 provided in the adjacent side wall of the casing 7^a. The plates 17^a are adapted to terminate, in the normal position of the parts, in alinement with the outer face of the housing 7^b and the slots 11^a and 18^a which are formed respectively in the walls of the housing 7^b and the plates 17^a are in this modification not elongated beyond the width of the key 12, but are preferably

of the same size as the key with the necessary clearance to permit the ready and easy insertion of the key through the slots.

Preferably the outer faces of the plates 17^a are spaced from the inner faces of the housing 7^a to avoid frictional contact therebetween on relative movement of the two members. Except as hereinbefore quoted, the construction of the modification is in all details similar to the construction of the form shown and hereinbefore fully described.

The operation of the modified form is also substantially identical with the operation of the form shown in Figures 1 to 3, the only difference in the operation being that as the casings 7^a and 7^b are separated substantially the same distance as the key 12 is spaced from the rear of the slot in the cheek plates, it will be apparent that the friction elements and the housing 7^b will on compression move rearwardly without any frictional action until the separated portions of the housing contact which will preferably occur simultaneously with the contact of the rear edge of the key 12 with the rear ends of the cheek plate slots. From this point the operation up to full travel under buffing movement is identical with that heretofore set forth. On release from full compression it will be obvious that as the plates 17^a are not in frictional contact with the housing 7^a that the plates 17^a, the housing 7^a, the friction elements and the key 12 will be forced forwardly by spring action without frictional resistance until the lugs 32 contact the forward ends of the slots 33. As soon as this occurs the further movement of the plates 17^a and the housing 7^b relative to the housing 7^a is prevented and the friction elements are brought into action to dampen the complete recoil movement of the parts to normal position. The operation of the parts under draft is substantially the same as heretofore described except for said slight changes as are due to the modification of the construction and since this change has already been pointed out with reference to the buffing shocks it is not believed that further description is necessary.

From the foregoing description and a study of the drawings it will be readily apparent that I have thus provided an extremely simple friction draft gear which attains all the beneficial results desired. In both of the modifications here shown it will be apparent that I have provided under both buffing and draft strains a high capacity simple or plain spring draft gear and that this simple or plain spring draft gear is combined with a friction mechanism in such a way that it not only cushions the shocks incident to train movements without bringing the friction elements into frictional action unless the shocks are of such magnitude as to exceed the capacity of the plain spring draft gear, but also acts to insure a positive and instantaneous release of the friction mechanism from either full compression under buff or draft strains and that this release action is of such character that all possibility of sticking from the friction elements is avoided and the release action is accompanied by sufficient power to positively return the parts to normal position without excessive shocks.

The device shown and hereinbefore described is, so far as I am aware, the first construction in which there is combined within the limits of a standard draft gear pocket a friction draft mechanism having a spring capacity equal to the total capacity of the twin spring type of draft gear employing class G springs and a friction draft gear whose ultimate capacity is equal to the ultimate capacity of the standard friction draft gears of the high capacity type and at the same time the total travel of the draft mechanism is maintained within the A. R. A. limits of 2¾ inches.

The device also is the first, so far as I am aware, in which a key is utilized as a stop member and as also a means for limiting the movement of relatively stationary plates in a friction draft mechanism. That is in my device the key member not only affords simple means for causing a relative sliding movement between the friction plates, but also serves to deliver to the sills, if desired, overloads placed upon the mechanism by excessive shocks under either buffing or draft movements.

While I have shown and described two embodiments of the invention, it will of course be understood that many modifications are possible and that changes may be made in the arrangement of the wedge mechanism for example and in the other parts and mechanism without departing from the inventive idea. In the language used to describe the mechanism it will be understood of course that the terms employed are to be taken in their descriptive and not in their limiting since what I desire to secure by Letters Patent is:

1. In a shock absorbing device for railway cars, the combination of a force applying member, yielding resistance members including a volute spring, friction members, a transverse member engaging said friction members intermediate their ends and movable by the force applying member in opposition to the yielding resistance members, and means operable upon additional movement of the force applying member to increase the frictional pressure upon the friction members.

2. In a shock absorbing mechanism of the character described, the combination of a bank of leaf springs, a key, plates connected with the key and adapted to engage the leaf springs, a series of intercalated friction plates certain of which are carried by the

key, a force applying member, wedge means cooperating with said plates and certain of said friction plates and the force applying member for moving the key and forcing the friction plates into positive frictional operative engagement, a follower engaged by said friction plates, and additional spring means for opposing movement of said follower.

3. In a shock absorbing mechanism, the combination of a housing formed of relatively movable sections, spring resistance means within one section, a plurality of friction members within the other section, a key passing through the second named section and said friction members, and means carried by the key and extending into the first named section for cooperation with said spring resistance means.

4. In a shock absorbing mechanism, a housing formed of sections, said sections having limited relative movement, spring resistance means within one section, friction members within the other section, a key extending transversely through said second named section and stationary with respect thereto, the key also passing through said friction members, and means carried by the key and stationary with respect thereto for cooperation with said spring resistance means, said last named means being located outwardly of said friction members.

5. In a friction draft gear, the combination of a housing formed of relatively movable sections, spring resistance means within one section, friction members within the other section, a key passing through said second named section and the friction members and stationary with respect to certain of the latter, plate members carried by the key and extending within said first named section for engagement with the spring resistance means, said first named section and said plate members being formed with cooperating stop means.

6. In a friction draft gear, the combination with center sills, front and rear stops and a follower, of a housing formed of forward and rear sections located between the center sills and the stops with the rear section in engagement with the rear stops, spring resistance means within said rear section, a plurality of friction members within the forward section, a key extending transversely through said forward section and through said friction members, means engageable by the follower for urging the friction members laterally, and plate members engaged by the key and mounted within the forward section, said plate members extending into the rear section for engagement with the spring resistance means.

7. In a friction draft gear, the combination with center sills, front and rear stops and a follower, of a housing formed of forward and rear sections located between the center sills and the stops with the rear section in engagement with the rear stops, spring resistance means within said rear section, a plurality of friction members within the forward section, a key extending transversely through said forward section and through said friction members, means engageable by the follower for urging the friction members laterally, and plate members engaged by the key and mounted within the forward section, said plate members extending into the rear section for engagement with the spring resistance means, the rear ends of said plate members having lateral lugs, and the rear section being slotted for the accommodation of said lugs to act as stop means.

8. In a spring-friction draft gear, in combination, a short travel high capacity spring and an energizing member therefor, a group of alternated friction plates and means applying pressure thereto, a transverse member whereby said plates are movable as a unit for a portion of the travel, said transverse member connecting said friction plates and said energizing member, and stop means whereby alternate of said plates and said energizing member remain stationary while the others continue to move for the balance of the travel.

9. In a shock absorbing mechanism, a housing, a follower, intercalated plate friction means, wedge means cooperating therewith, resistance means opposing movement of the wedge means, additional spring resistance means and energizing members therefor operative during a portion of the travel, and a transverse key cooperating with said housing, said intercalated plate friction means, said wedge means and said energizing members, and movable during a portion of the travel and stationary during a portion of the travel.

10. In a shock absorbing mechanism, a follower, a friction unit engageable thereby and including intercalated plates and wedge means for applying lateral pressure thereto, a transverse member engaged by said friction unit and movable thereby during a portion of the travel of the follower, means for maintaining said transverse member stationary throughout the remainder of the travel of the follower, spring means opposing movement of said friction unit, other spring means opposing movement of said transverse member, said first named spring means operating alone during the first portion of the travel of the follower, operating simultaneously with the second named spring means during a further portion of the travel of the follower, and said first named spring means continuing its action throughout the remainder of the travel.

11. In a shock absorbing mechanism, a follower, a friction unit engageable thereby and including intercalated plates and wedge

means for applying lateral pressure thereto, a transverse member engaged by said friction unit and movable thereby during a portion of the travel of the follower, means for maintaining said transverse member stationary throughout the remainder of the travel of the follower, spring means opposing movement of said friction unit, other spring means opposing movement of said transverse member, said first named spring means operating alone during the first portion of the travel of the follower, operating simultaneously with the second named spring means during a further portion of the travel of the follower, and said first named spring means continuing its action throughout the remainder of the travel, said first named spring means being of volute form.

12. In a shock absorbing mechanism, a follower, a friction unit engageable thereby and including intercalated plates and wedge means for applying lateral pressure thereto, a transverse member engaged by said friction unit and movable thereby during a portion of the travel of the follower, means for maintaining said transverse member stationary throughout the remainder of the travel of the follower, spring means opposing movement of said friction unit, other spring means opposing movement of said transverse member, said first named spring means operating alone during the first portion of the travel of the follower, operating simultaneously with the second named spring means during a further portion of the travel of the follower, said first named spring means continuing its action throughout the remainder of the travel, said first named spring means being of volute form and said second named spring means comprising a bank of spring plates.

13. In a shock absorbing mechanism, a follower, a friction unit engageable thereby and including intercalated plates and wedge means for applying lateral pressure thereto, a transverse member engaged by said friction unit and movable thereby during a portion of the travel of the follower, means for maintaining said transverse member stationary through the the remainder of the travel of the follower, spring means opposing movement of said friction unit, other spring means opposing movement of said transverse member, said first named spring means operating alone during the first portion of the travel of the follower, operating simultaneously with the second named spring means during a further portion of the travel of the follower, said first named spring means continuing its action throughout the remainder of the travel, said second named spring means comprising a blank of plate springs and said first named spring means being of volute form and arranged in tandem with the second named spring means.

14. In a shock absorbing mechanism, a follower, a friction unit engageable thereby and including intercalated plates and wedge means for applying lateral pressure thereto, a transverse member engaged by said friction unit and movable thereby during a portion of the travel of the follower, means for maintaining said transverse member stationary throughout the remainder of the travel of the follower, spring means opposing movement of said friction unit, other spring means opposing movement of said transverse member, said first named spring means operating alone during the first portion of the travel of the follower, operating simultaneously with the second named spring means during a further portion of the travel of the follower, said first named spring means continuing its action through the remainder of the travel, said second named spring means comprising a bank of friction producing plate springs, and said first named spring means being a volute spring directly abuttingly engaging the second named spring means.

15. In a shock absorbing mechanism, a follower, a friction unit including intercalated friction plates and wedge means for applying lateral pressure thereto, said wedge means being initially in engagement with the follower and said intercalated plates being subsequently engageable by the follower, spring means opposing movement of the friction unit throughout the travel of the follower, a second spring means, and means cooperating with said wedge means and movable with the friction unit for applying pressure to said second named spring means during a portion of the travel of the follower.

16. In a shock absorbing mechanism, a follower, a friction unit including intercalated friction plates and wedge means for applying lateral pressure thereto upon movement of the follower, volute spring means for resisting movement of the friction unit throughout the travel of the follower, a short travel high resistance spring arranged in tandem with the volute spring means, means extending through the friction unit and carrying certain of the intercalated plates, and means cooperating with said wedge means and carried by said transverse member and adapted to compress said second named spring means throughout a portion of the travel of the follower.

17. In a shock absorbing mechanism, the combination of a follower, a friction unit movable thereby, volute spring means resisting movement of the friction unit throughout the travel of the follower, and plate spring means energizable by movement of the friction unit during the first portion of the travel of the follower.

18. In a shock absorbing mechanism, the

combination of a follower, a friction producing unit movable and operable thereby upon movement thereof, volute spring means resisting movement of said unit throughout the travel of the follower, a short travel high capacity spring, and means movable with and by said friction producing unit during the first portion of the travel of the follower for energizing said second named spring in parallel with said first named spring.

19. In a shock absorbing mechanism, the combination of a follower, a friction producing assembly operable thereby upon movement thereof, volute spring means opposing movement of said assembly, a short travel high capacity preliminary spring means arranged in tandem with said volute spring means, and means operable by said assembly upon movement thereof for compressing said second named spring, said first named spring being initially compressed alone for the initial travel of the follower, the first and second named spring means being energized simultaneously throughout the intermediate portion of the travel of the follower, and said first named spring means continuing to be energized after the second named spring means goes solid throughout the remainder of the travel of the follower.

In testimony whereof I affix my signature.

CYRUS J. HOLLAND.