June 28, 1938. D. F. SPROUL 2,121,833

DRAFT GEAR

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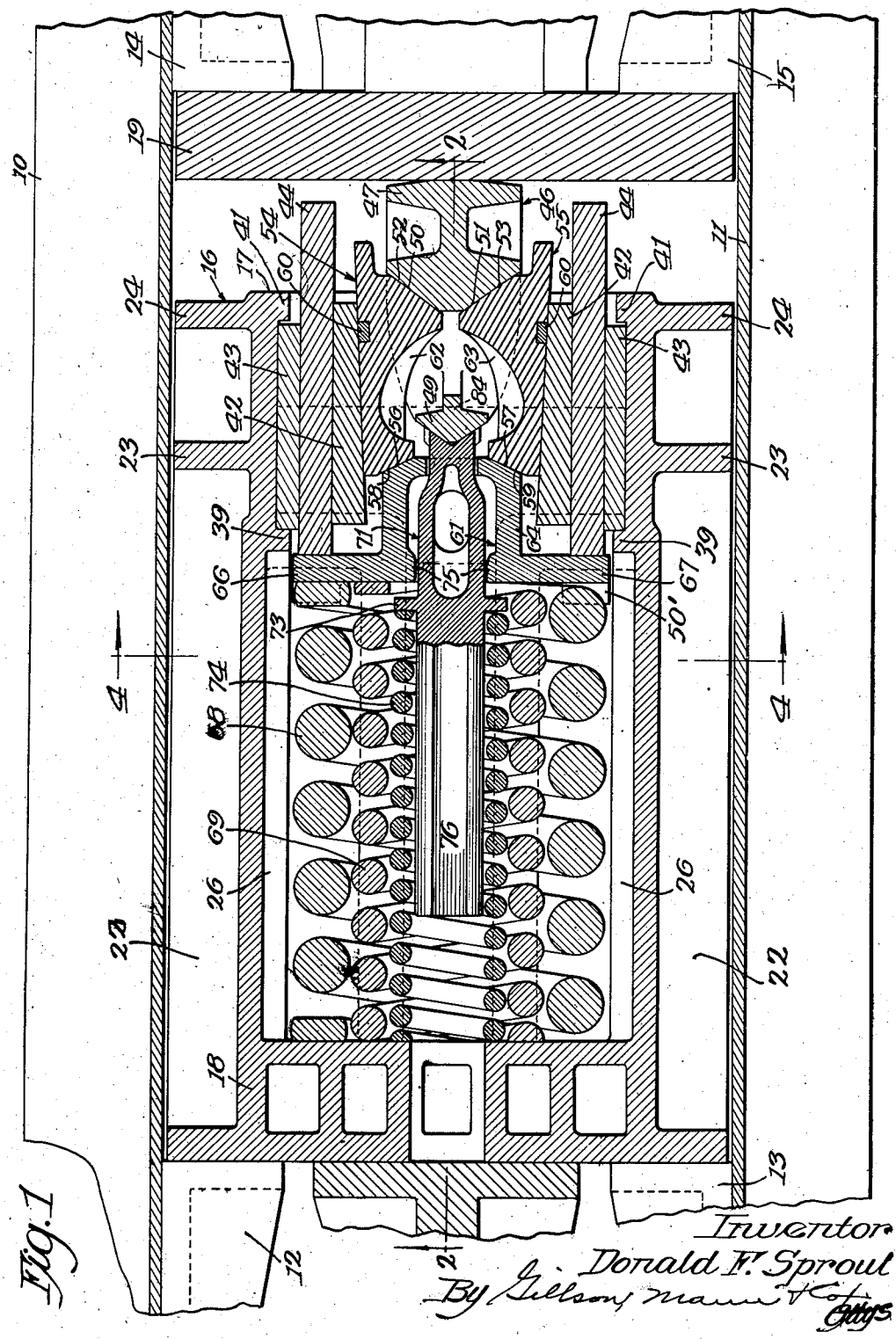


Fig. 1

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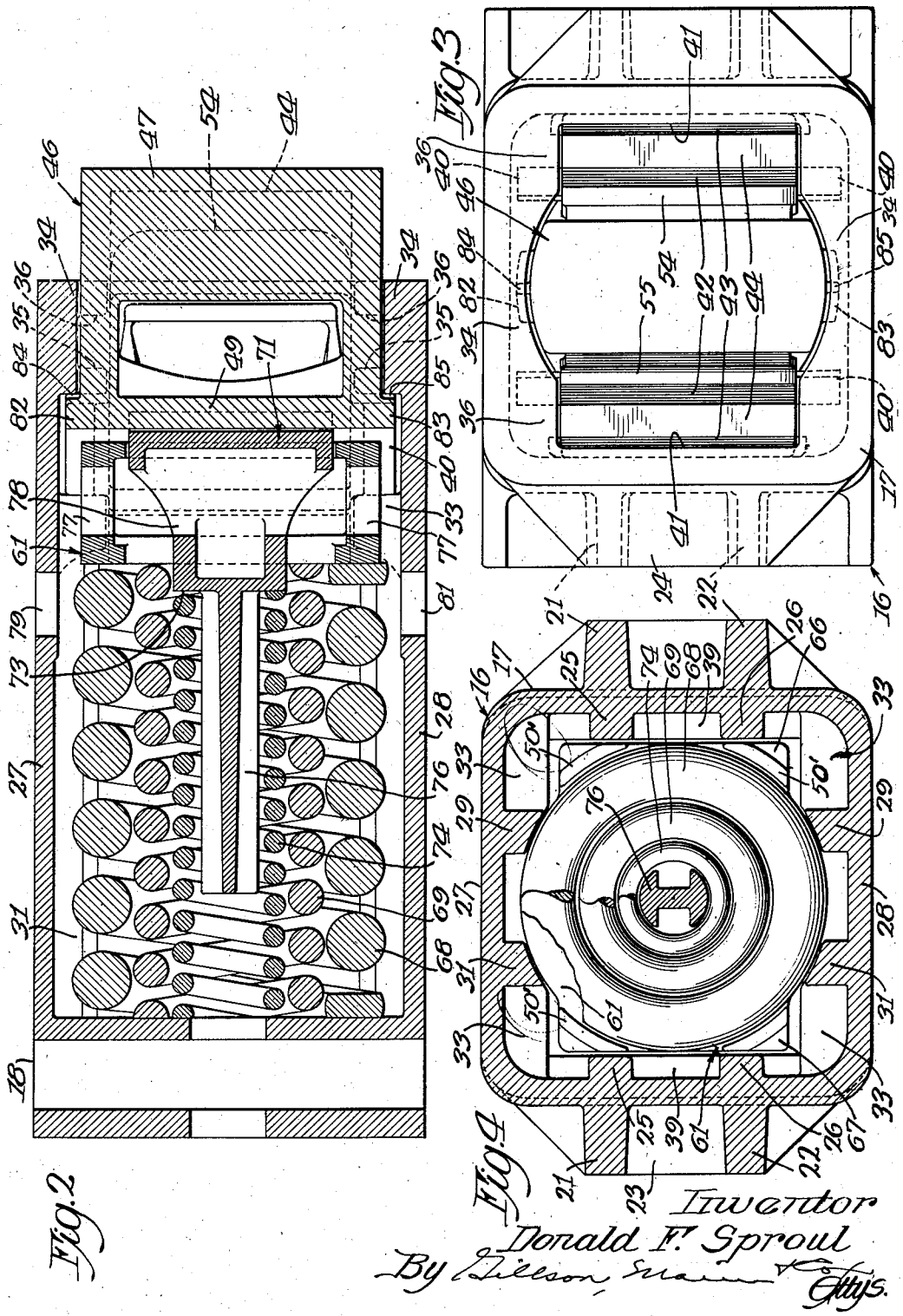


Fig. 2

Fig. 3

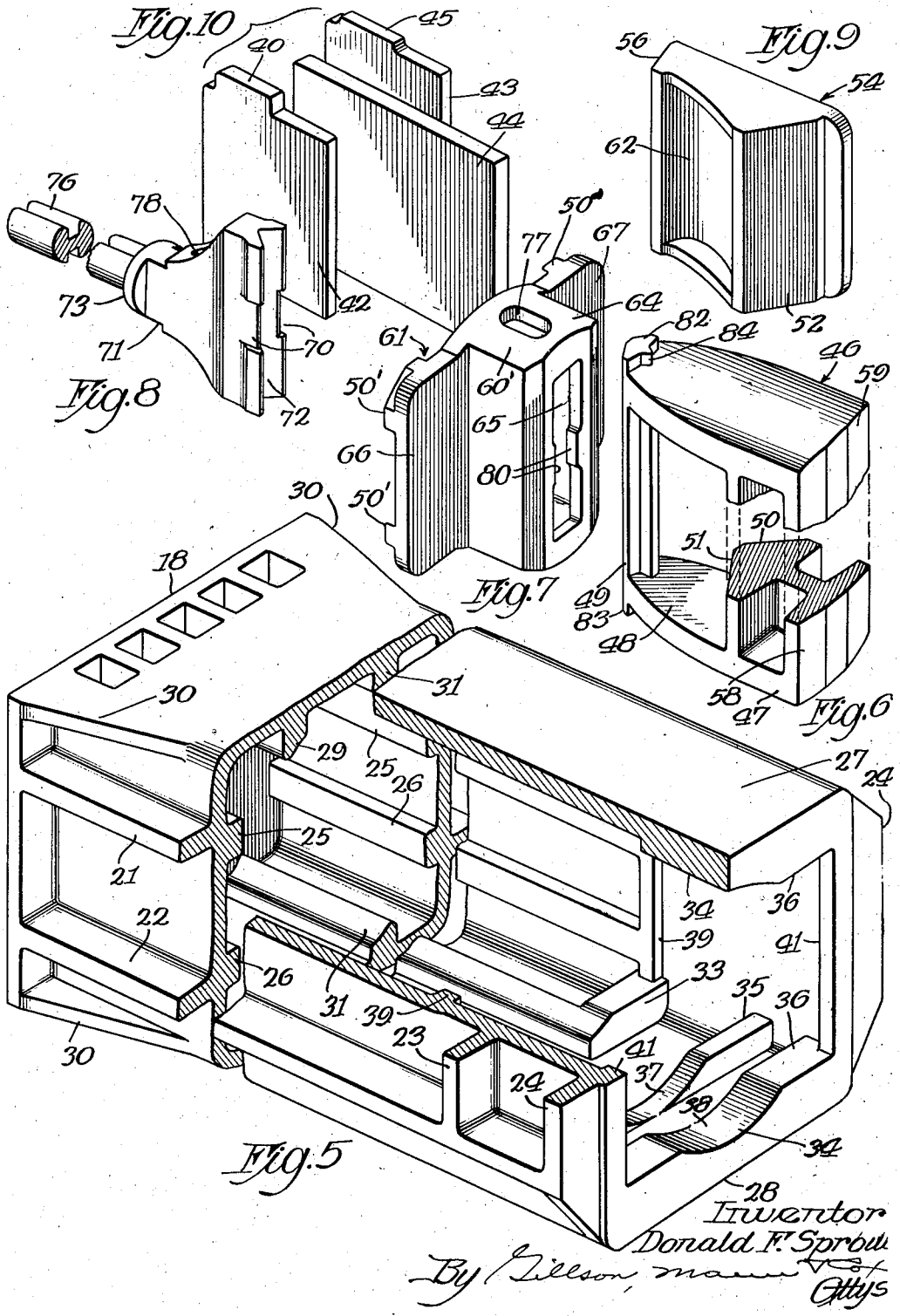
Fig. 4

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2,121,833

DRAFT GEAR

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11 Claims. (Cl. 213—33)

This invention relates to draft gears for railway cars and the like, and more particularly to the friction type of draft gear.

One of the objects of the invention is the provision of a new and improved draft gear provided with novel means for retaining the movable parts of the gear in proper alignment during the operation of the gear.

Another object of the invention is the provision of a new and improved draft gear provided with novel means for releasing the wedging mechanism during the initial release movement.

A still further object of the invention is the provision of a new and improved casing for a draft gear that is provided with novel means for strengthening or reinforcing the casing and for positioning the spring elements therein.

A further object of the invention is the provision of new and improved means for temporarily shortening the length of the gear and which is automatically removed upon the initial use of the gear.

Another object of the invention is the provision of a new and improved draft gear that is prompt in release, effective and efficient in operation, inexpensive to manufacture, simple in construction, relatively easy to assemble and when assembled difficult to disassemble and which is not likely to become broken or get out-of-repair.

Other and further objects and advantages of the invention will appear from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a horizontal section of the center sills of a railway car showing the invention in position thereon, also in horizontal section;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is an end elevation of a shock absorber;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a perspective view of the casing;

Fig. 6 is a perspective view of the central or thrust wedge;

Fig. 7 is a perspective view of the outer spring seat;

Fig. 8 is a perspective view of the inner spring seat;

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

Fig. 10 is a perspective view of one of the friction plate groups.

Referring now to the drawings, the reference characters 10 and 11 designate the center sills of a railway car having the buffing lugs 12 and 13 and the draft lugs 14 and 15 thereon, as is usual in such constructions.

Supported between the draft and buffer lugs is a draft gear 16 comprising a casing 17 open at one end and having its opposite end preferably, though not necessarily, provided with an integral follower 18. The follower 18 is adapted to engage the buffing lugs 12 and 13, and a follower 19 is inserted between the draft lugs 14 and 15 and the draft gear 16.

The casing 17 is provided with one or more external ribs extending longitudinally thereof for reinforcing the casing. As shown, each side of the gear is provided with two external ribs 21 and 22, respectively, and with the reinforcing ribs 23 and 24 adjacent to the forward end which extend transversely to the ribs 21 and 22. Additional ribs 30 reinforce the corners of the casing.

In order to further strengthen the casing so that the same may take the overload without distortion, the inner surface of the casing is also provided with ribs extending longitudinally of the gear. As shown, each of the side walls of the gear is provided with reinforcing ribs 25 and 26 which will project inwardly from the walls of the casing and extend longitudinally of said casing. These ribs, if desired may be arranged opposite the external ribs 21 and 22. The internal reinforcing ribs 25 and 26 also function to position the spring seat, as will presently appear.

The top wall 27 and the bottom wall 28 of the casing are each provided with reinforcing ribs 29 and 31 which extend longitudinally of the gear and have their inner edges cut away on the arc of a circle for providing clearance for the springs and for positioning the same, as will presently appear.

For convenience of description, the closed end of the gear will be referred to as the rear end thereof. The forward end of the casing is open and the top and bottom walls are provided with ribs 33 and 34 extending transversely of the casing adjacent to the forward ends of the ribs 29 and 31. The ribs 33 and 34 constitute shoulders for the stationary friction plates, as will presently appear. The ribs 33 extend only a short distance inwardly from each side so as to provide clearance for the springs which extend along the center line of the gear.

The rib 34 comprises the rib extensions 35 and 36 at each side of the central portion of the gear. These ribs merge at their base and are cut away at the central portion to form curved surfaces 37 and 38 to provide clearance for inserting the springs in the casing during the assembling operation and to provide clearance for the central wedge or thrust member.

The forward end of the gear is also provided with retaining ribs 39 and 41 on each side wall. These ribs are spaced apart for receiving wear plates, as will presently appear.

Two groups of intercalated friction plates are arranged at each side of the gear. Each group comprises two sets of plates, one set of which is movable and the other stationary. As shown, each of the groups comprises the stationary or stationary friction plate 42, a wear plate 43 and a movable plate 44. The movable friction plates 44 extend normally forwardly of the casing 17 and are adapted to be engaged by the follower block 19 when the gear is compressed beyond a predetermined point. The stationary friction plate 42 is provided with projections 40 at each side thereof for engaging the ribs 33 and 35 on the top and bottom walls for preventing the plate from moving longitudinally of the gear in either direction. The wear plate 43 is also provided with projections 45 at each side thereof for engaging the shoulders 33 and 35 for preventing longitudinal movement of this plate. Each wear plate also engages the ribs 39 and 41 at its forward and rear ends. The capacity of the gear may be varied by varying the angle of the stationary friction plate 42, as will presently appear.

The two groups of friction plates are adapted to be forced into frictional engagement with each other for resisting the compression of the gear by suitable wedge elements or wedge mechanism. In the form of construction shown, which is by way of example only, this mechanism comprises a central, or thrust, wedge member 46 (see Figs. 1 and 6) having a head 47, a hollow body portion 48 and a tapered nose portion 49, and also that portion of housing 64 which has the inclined surfaces 56 and 57. The head 47 is provided with rearwardly facing V-shaped or wedge surfaces 50 and 51 which are adapted to engage inclined faces 52 and 53 on wedge shoes 54 and 55 for forcing said shoes laterally outwardly into frictional engagement with the friction plates during the compression of the gear.

The wedge shoes 54 and 55 are provided at their rear ends with inclined surfaces 56 and 57 which are adapted to engage corresponding inclined surfaces 58 and 59 on a housing 64 formed on an outer spring seat 61. These wedge shoes have plane friction surfaces on their outer sides for frictionally engaging the plates 42. If desired, the friction surfaces of the wedge shoes may be provided with wear resisting inserts 60. The shoes are also provided with concave surfaces 62 and 63 intermediate their ends on their inner sides, thus affording clearance for the nose portion 49 of the central, or thrust, wedge member 46, as clearly shown in Fig. 1 of the drawings.

The spring seat 61 is provided with a forwardly extending hollow projection or housing 64 having a slot 65 in its front wall through which the release element 71 extends, as will presently appear. This seat is also provided with laterally extending flanges 66 and 67 against which the movable friction plates 44 are adapted to seat. These flanges are provided with spring positioning lugs 59'. The flanges 66 and 67 terminate in proximity to the ribs 25 and 26 on the casing 17 whereby the spring seat 61 is guided on its inward movement. The ends of the spring seat are curved, as at 60', to conform to the curvature of the inner ends of the ribs 29 and 31 which also guide the spring seat.

Suitable means are provided for resiliently resisting the compression of the gear and for returning the parts to normal position after compression. Spring mechanism is employed for this purpose. In the form of the device selected to illustrate one embodiment of this invention, a plurality of helical springs 68 and 69, two being shown, are employed. The spring 69 is arranged within the spring 68, both springs seating against the rear end of the casing and against the spring seat 61 at their forward ends.

It is desirable that there be a prompt release of the gear after compression. In the present invention, suitable means are provided for loosening the wedging mechanism when the pressure is released. In the form of construction shown, a release element 71 is employed. The element has its forward end extending through the housing 64 and the slot 65 therein and is provided with recesses 70 in which guide lugs 69 engage. It is also provided with a recess 72 in which the nose portion 49 of the thrust wedge member is adapted to engage, as shown more clearly in Fig. 1 of the drawings.

An intermediate portion of the release element 71 is provided with a flange 73 extending about the same which constitutes a spring seat and against which a coil spring 74 is adapted to seat. The spring 74 is arranged within a spring 69 and seats against the closed end of the gear. The flange 73 is located rearwardly of the spring seat 61.

Proper means are provided for holding the various parts of the wedge mechanism in operative position during the compression of the gear. As shown, the release element 71 is employed for this purpose. The forward end of this element extends axially through the housing 64, and since the housing is of considerable depth, the marginal edges of the opening 65 and the opening through the base of the housing will guide the longitudinal movement of the release element 71 and will prevent the angular movement or skewing of the spring seat 61 as it moves inwardly during the gear compression. The slot 65 is only sufficiently enlarged to provide clearance, and, if desired, the opening in the base of the housing may be provided with inwardly extending ribs 75 which will assist in forming a guide for the spring seat 61 on the release element 71.

The rear end of the release element 71 is elongated, as at 76, and being of a diameter but slightly smaller than the internal diameter of the spring 74, the said spring will prevent angular movement of the release element 71 during the operation of the gear. Since the release element 71 is held by the springs axially of the gear and since the spring seat 61 cannot move angularly relative to the release element 71, the spring seat 61 will be held in proper operative position.

Since there is but a small clearance between the springs and between the spring 68 and the ribs 29 and 31 and between the extension 76 and the spring 74, the release element 71 is held from angular movement and it in turn prevents skewing of the wedging mechanism.

In the inoperative or normal position of the gear parts, the central or thrust, wedge member 46 extends forwardly of the casing 17 beyond the forward ends of the movable plates 44 and engages the follower 19. The parts are assembled with the springs under compression.

For convenience of assembly, the housing **64**, release element **71** and the casing **17** are provided with openings **77**, **78**, **79** and **81** which may be brought into alignment by compressing the springs. In assembling the gear, the springs are first inserted, then the release element **71** and then the spring seat **61** are inserted and the springs compressed to bring the openings **77** and **78** into register with the openings **79** and **81** of the casing, after which a key is inserted through said openings. The stationary plates **42**, the thrust, or central, wedge **46**, the wear plates **43**, shoes **54** and **55**, and the movable plates **44** are then placed in position and the key removed. The central, or thrust, wedge **46** is provided with laterally extending shoulders **82** and **83** that are adapted to engage the shoulders formed by ribs **34** for limiting the outward movement of said thrust, or central, wedge **46**.

In order to facilitate the insertion of the gear between the draft and buffer lugs, suitable means are provided for temporarily shortening the length of the gear, said means being such as to automatically become non-operative upon using the gear. As shown, the shoulders **82** and **83** are provided with forwardly extending projections **84** and **85** (see Figs. 2 and 6) which engage the ribs **34** for limiting the expansion of the gear. These extensions are narrow and light, but have sufficient strength to hold the gear slightly shorter than its normal length until it is installed. A few expansions of the gear will wear these projections away to permit normal expansion of the gear. They are designed solely to temporarily shorten the over-all length of the gear in order to compensate for variations in the length of the draft gear pockets of various cars.

In the operation of the gear during its initial compression, the thrust, or central, wedge member **46** may be considered as being forced rearwardly by the follower **19**. This rearward movement of the thrust wedge member **46** tends to move the shoes **54** and **55** rearwardly with it, but the springs **68** and **69** resist this rearward movement, whereby the shoes are forced apart, thereby forcing the friction plates laterally into frictional engagement. The wedging mechanism is "set up" by the time the follower **19** engages the ends of the movable friction plates **44**. On further compression, the plates **44** are moved rearwardly and the frictional resistance to their movement will absorb a greater portion of the shock. Furthermore, since the space between the plates **42** tapers rearwardly, the shoes **54** and **55** will be forced laterally inwardly as they are advanced, thereby forcing the central wedging faces on the central wedge **46** and the wedging faces on the housing **64** farther apart with the result that the spring seat **61** moves rearwardly more rapidly than the central wedge member **46**. This added or differential movement of the spring seat **61** will cause an increasing resistance to the rearward movement of the shoes **54** and **55**.

Since the spring seat is moved rearwardly at a greater speed than the central wedge member and shoes, it is evident that the springs **68** and **69** are compressed far more than if the plates **42** were not tapered. The greater the angle of the inclined faces of these plates **42**, the greater will be the movement of the shoes toward each other and the more the springs **68** and **69** will be compressed by a given rearward movement of the wedge member **46**. It will, therefore, be seen that the capacity of the gear may be varied by changing the angle formed by the faces of the plates **42**.

Upon release of the gear, the inner spring **74**, which acts directly against the release element **71**, moves the same together with the central wedge member promptly forwardly and releases the wedging mechanism, whereupon the springs **68** and **69** return the plates to inoperative position.

I claim as my invention:—

1. In a draft gear, a casing having an open end, a group of intercalated stationary and movable friction plates at each side of said casing at its open end, means for fixing certain of said plates to said casing, certain of said plates being tapered forwardly, means for forcing said plates laterally into frictional engagement, said means comprising a thrust wedge member having wedge faces thereon, a friction shoe at each side of said wedge member in engagement with said groups of plates, said shoes having inclined faces thereon at their rear ends and having inclined faces at their forward ends in engagement with said wedge faces, a spring seat in engagement with the rear ends of said movable plates, means on said spring seat having wedging engagement with the inclined faces at the rear end of said shoes, a release element in engagement with said thrust wedge member and extending as a unitary structure through said seat and last-named means, resilient means for resisting the inward movement of said spring seat, resilient means for resisting the inward movement of said thrust wedge member and means including engaging shoulders on said wedge member and casing for limiting the outward movement of said wedge member for limiting the outward movement of said spring seat, said movable plates extending forwardly beyond said casing and said thrust wedge member extending forwardly beyond said movable wedges, when the gear is expanded.

2. In a draft gear, a casing having reinforcing and spring positioning ribs on its inner surface and reinforcing ribs on its outer sides, all of said ribs extending longitudinally of the casing, the ribs on the exterior of said casing at the sides thereof being opposite corresponding ribs on the interior and ribs extending transversely of said casing at the ends thereof for reinforcing the corners of said casing.

3. A spring seat comprising an elongated hollow portion provided with wedge faces on its free end and having laterally extending flanges at its opposite end provided with spring retaining lugs on their faces opposite said hollow portion, said hollow portion having aligned axial openings in its base and in the portion between said wedge faces through which a release element is adapted to extend.

4. A draft gear comprising a casing, a plurality of friction plates within said casing, a plurality of friction plates movable longitudinally of said casing, a spring seat for resisting the inward movement of said plates, a plurality of nested springs, wedge shoes having two sets of wedge surfaces movable longitudinally of said casing, a thrust wedge member for engaging one set of wedge surfaces, said spring seat being provided with a hollow extension having wedge faces on its outer extremity for engaging the other set of wedge surfaces, a release element extending through said spring seat and engaging said wedge member, said release element having a shoulder and arm extension, a spring surrounding said extension and engaging said shoulder for resist-

ing the inward movement of said release element during the compression of said gear, said extension extending within said spring beyond a plurality of turns of said spring.

5. A draft gear comprising a casing, friction plates within said casing, wedge shoes within said casing, a spring seat having a base portion and a body portion provided with wedging faces for engaging said wedge shoes for forcing said plates into frictional engagement during the compression of said gear, coil springs certain of which engage said base portion for yieldingly resisting the compression of said gear and a release member slidably engaging said body and base portions, and having an extension extending into one of said springs beyond a plurality of the coils thereof for preventing the skewing of said spring seat.

6. In a draft gear, a casing having one end open and having a follower integral with the other end, a plurality of intercalated friction plates at each side of said gear, wedge mechanism for forcing said plates into frictional engagement including a spring seat, a spring, means for resisting the inward movement of said mechanism, certain parts of said mechanism extending outwardly of said casing and certain other parts extending axially of said gear into said spring a substantial distance through a plurality of the turns thereof and adapted to engage said seat at widely separated points for preventing skewing of said seat, and means for holding said mechanism in operative position.

7. In a draft gear, a spring seat member comprising a body portion having a V-shaped recess in its outer end for receiving the inner end of a thrust element, an axial extension of said body portion, said body portion having a spring seat integral therewith and extending around the same adjacent said extension for constituting an abutment for a spring, said body portion provided with a transverse opening outwardly of said spring seat and inwardly of said recess, said axial extension being of a substantial length.

8. In a draft gear, a casing having internal strengthening ribs extending longitudinally thereof, a plurality of groups of intercalated friction plates extending into said casing, a pair of friction shoes frictionally engaging said groups of plates, a spring seat forming a rigid part of a portion of wedge mechanism for resisting the inward movement of certain of said plates, wedge mechanism for forcing said plates into frictional engagement, means including a plurality of coaxial spiral springs for resisting the inward movement of said seat and wedge mechanism, said springs being positioned in said casing by said ribs, and means having one end engaging certain parts of said wedge mechanism at a plurality of separated points and having its other end extending into said springs a substantial distance and through a plurality of the turns thereof for preventing skewing of said seat during the release of said gear.

9. In a draft gear mechanism, a housing member having shoulders on its inner surface, a plurality of friction elements within said housing member including a central wedge member, a release member, a spring for engaging said release member for resisting its inward movement, means including an interlocking connection between said release and central wedge members for preventing skewing of said central wedge member, said central wedge member having lateral projections extending outwardly behind said shoulders, and deformable means on said lateral projections for engaging said shoulders for temporarily preventing the normal expansion of said gear without interfering with its operation as a shock absorber.

10. In a draft gear, a casing, a plurality of friction elements within said casing, a wedge member engaging said elements for forcing the same into frictional engagement with one another when said gear is compressed, a spring seat for engaging certain of said elements, resilient means engaging said seat for resisting the inward movement of said seat, a release member extending through said seat and engaging the inner end portion of said wedge member, said release member having an extension provided with a shoulder, a spring engaging said shoulder and having a plurality of turns extending about said extension for releasing said wedge member on the release of said gear and for holding said extension in alinement with said wedge member, said release member extending axially through said spring seat for preventing the same from skewing during the operation of said gear.

11. A draft gear comprising a casing, a plurality of intercalated friction plates within said casing at each side thereof, certain of said plates being tapered forwardly, means on said casing for preventing certain of said plates from longitudinal movement therein and the remaining plates being movable longitudinally of said casing and extending forwardly beyond the end thereof, means, including a central wedge member, at opposite ends of said plates for compressing the latter upon compression of the gear, said wedge member being independently movable for compressing said plates laterally into frictional engagement, spring means for resisting the compression of said gear, easily deformable means rigid with one of said second-named means for engaging shoulders on said casing for limiting the outward movement of the wedge member during the initial operation of the gear only, and means independent of said spring means for positively releasing one of said central wedge members upon the release of the compressive force on said gear.

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