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DRAFT GEAR.

APPLICATION FILED OCT. 11, 1907.

989,949.

Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

Fig. 1

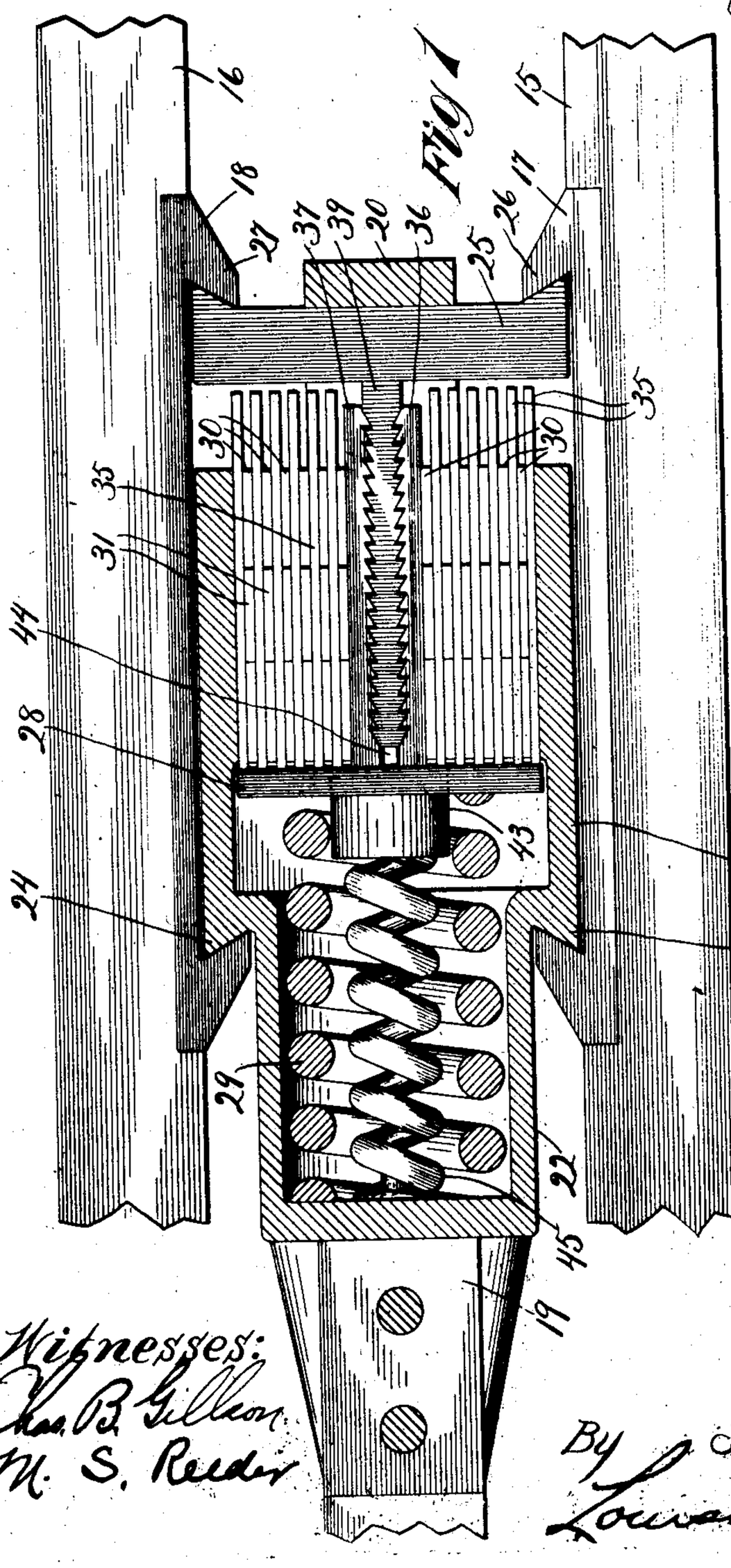


Fig. 6.

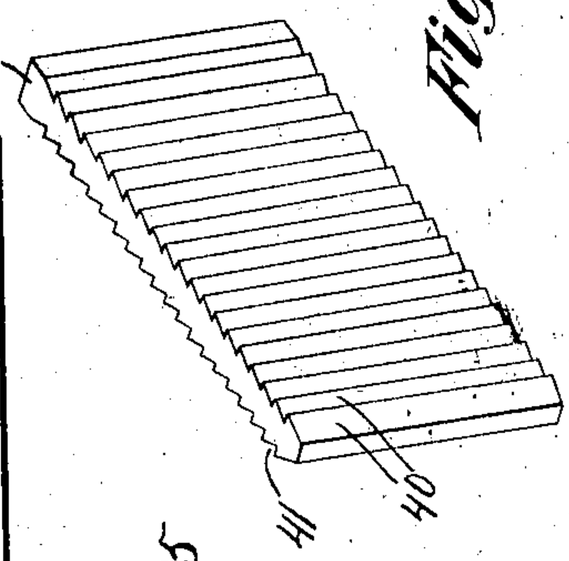


Fig. 5.

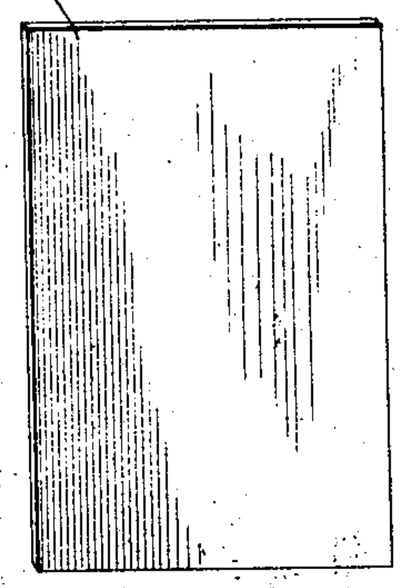
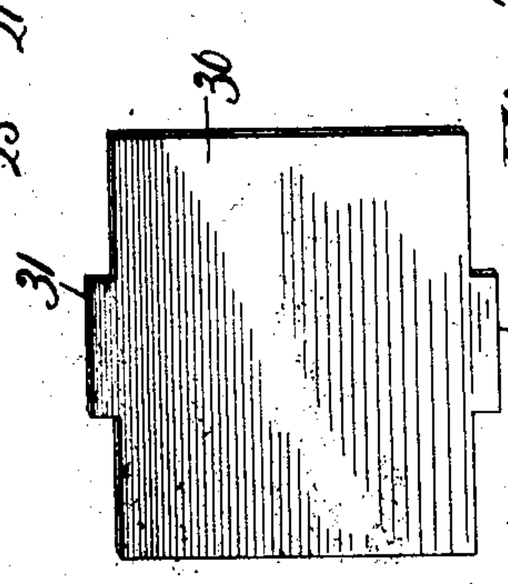


Fig. 7.



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3 SHEETS—SHEET 2.

Fig. 2.

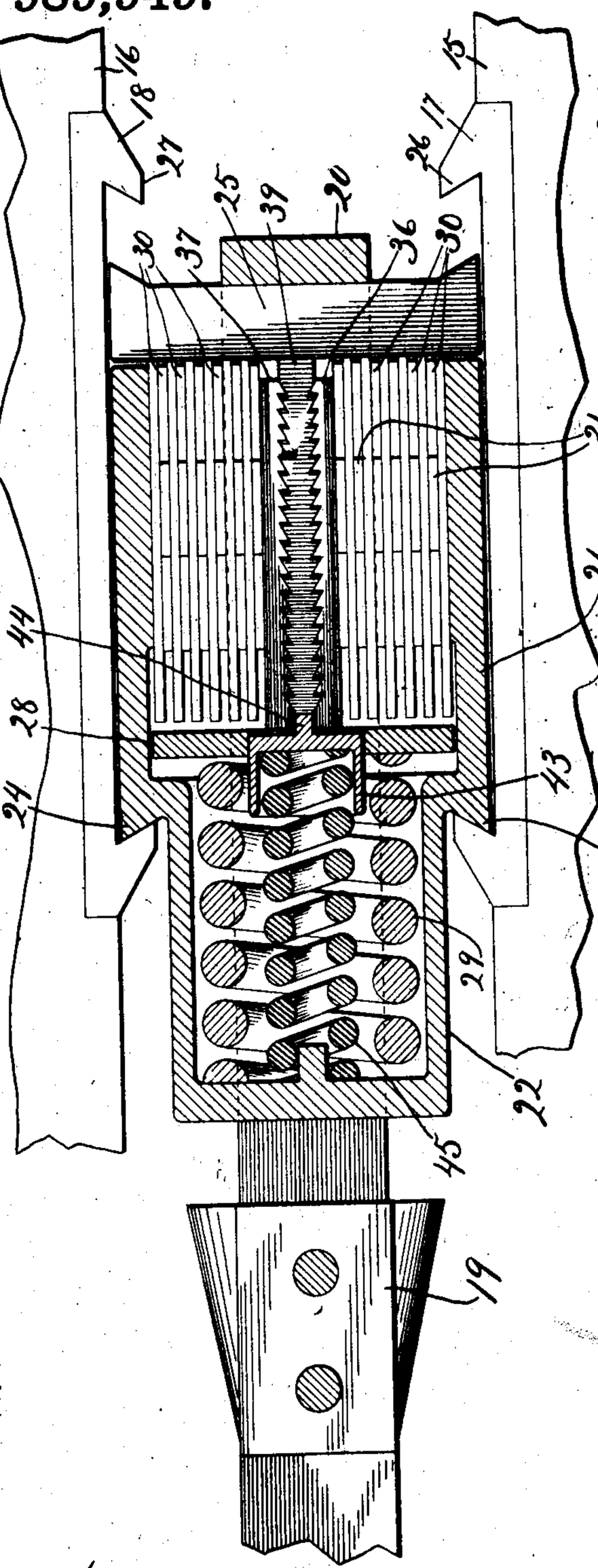
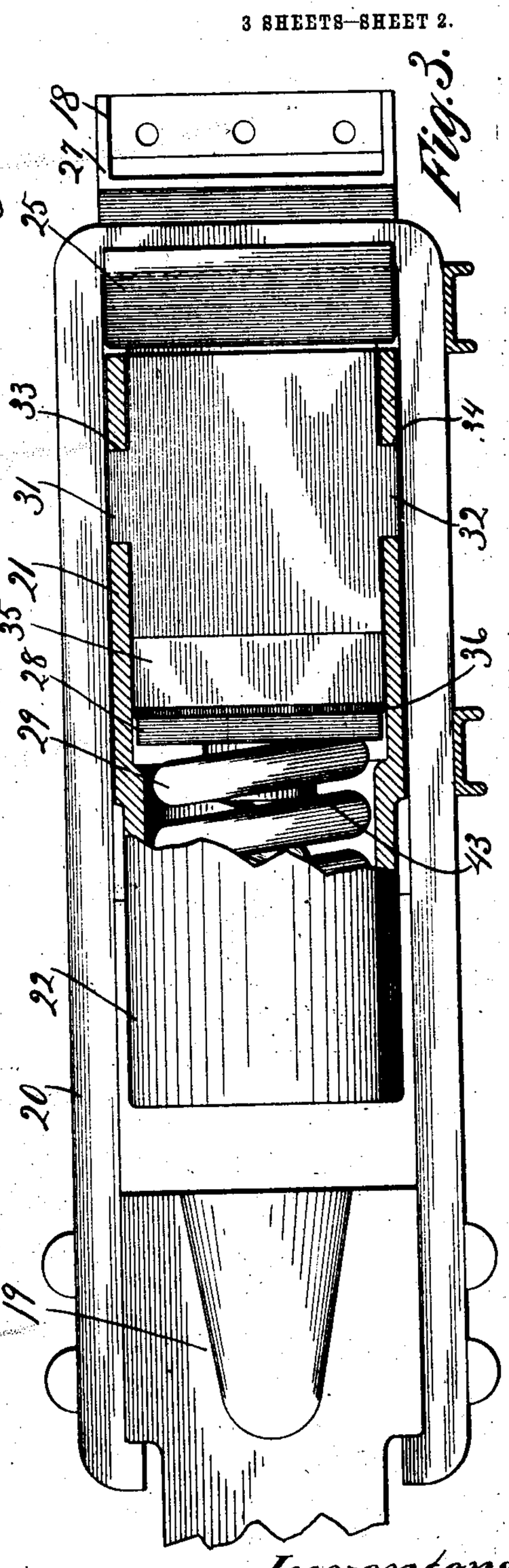


Fig. 3.



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3 SHEETS—SHEET 3.

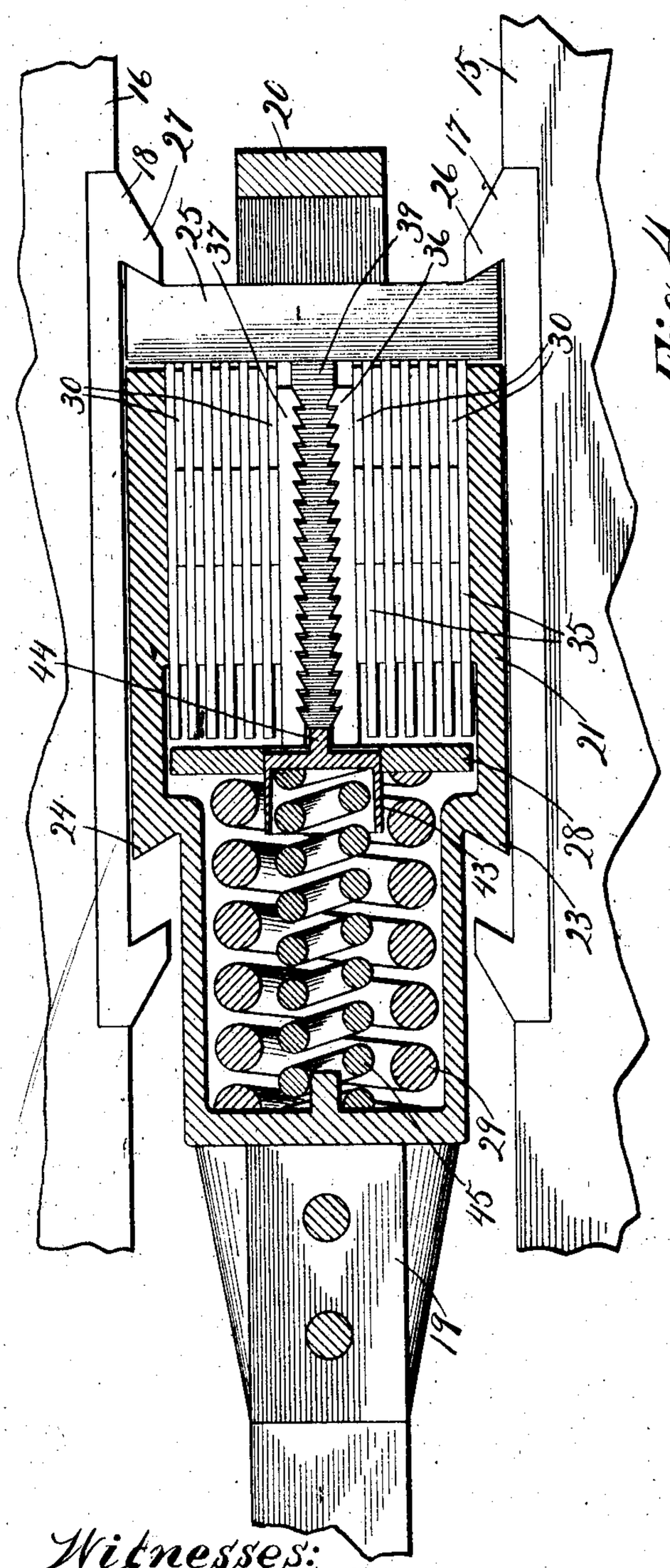

Fig. 4

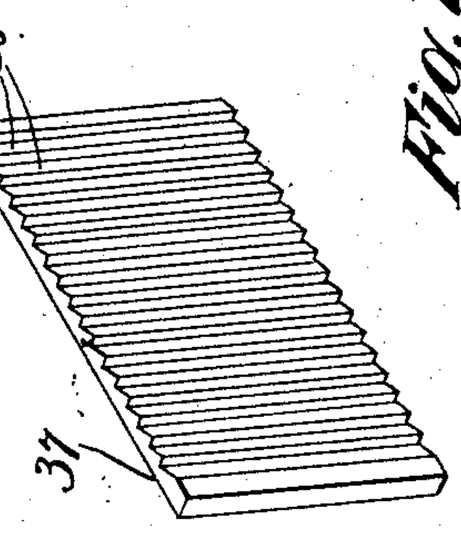

Fig. 10.

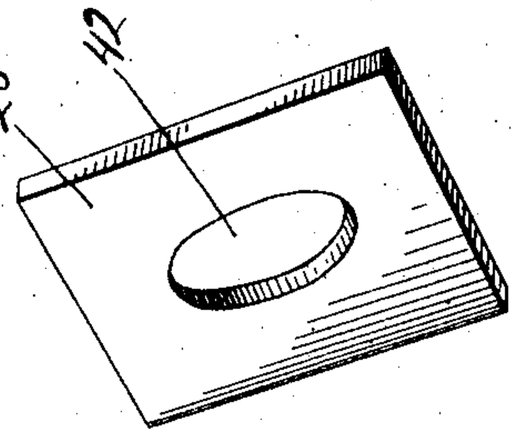

Fig. 9.

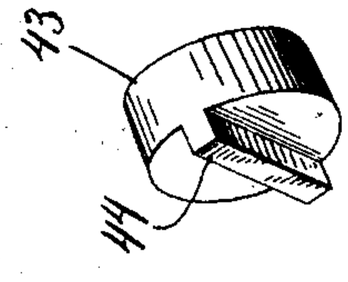

Fig. 8.

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UNITED STATES PATENT OFFICE.

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DRAFT-GEAR.

989,949. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed October 11, 1307. Serial No. 397,025.

To all whom it may concern:

Be it known that we, WALTER H. COTTON and THOMAS D. HENDERSON, citizens of the United States, and residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Draft-Gears, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to that type of draft appliances for railway cars commonly known as friction draft gears, and in which the stresses due to either pulling or buffing are dissipated in part by the frictional engagement of the sliding members.

The object of the invention is to secure a high degree of efficiency, not only in resisting the initial stress but in dissipating the recoil.

The invention is exemplified in the structure hereinafter described, and which is illustrated in the accompanying drawings, in which—

Figure 1 is a plan section of the draft gear as applied to the sills of a railway car shown in the position of inaction; Fig. 2 is a similar view, the parts being shown in the position taken when subjected to pulling stresses; Fig. 3 is a side elevation, partly in section, of the devices shown in Fig. 2; Fig. 4 is a plan section of the device, the parts being shown in the position assumed under buffing stresses; Figs. 5, 6, 7, 8, 9 and 10 are details of various plates and supplementary followers entering into the construction of the device.

A pair of draft sills is represented at 15, 16; a pair of cheek-plates 17, 18, being applied to the inner faces thereof. The usual draw-bar is shown at 19, and the tail-strap or loop attached to the draw-bar and encircling the draft gear proper is represented at 20. All of these parts are of usual construction, except as hereinafter pointed out.

The springs and friction devices are inclosed within a housing, shown as in integral casting open at its rearward end, its body portion 21 being square and its forward closed end 22 being reduced in size and round in cross section. The forward end of the body portion 21 of this housing constitutes the shoulders 23, 24, for engaging the forward shoulders of the cheek-plates 17, 18. A rear follower plate 25 coöperates with the rear shoulders 26, 27, of the cheek-plates, and is engaged by the tail-strap 20.

A supplemental follower 28 fits loosely within the chamber of the body portion 21 of the housing, and between it and the forward end of the extension 22 of the housing there is located a powerful expansion spring 29. Back of the follower 28 the housing is filled with a series of friction plates and a set of wedging plates. The friction plates are of two forms, arranged in alternation and disposed in two sets, one on either side of the wedging devices, the latter occupying the vertical median plane of the housing.

The friction plates 30 are provided at their upper and lower edges with projecting bosses 31, 32, adapted to fit within complementary recesses 33, 34, in the top and bottom of the body of the housing, to which they are consequently locked against longitudinal movement while being free to move laterally. The friction plates 35 are of greater length than the plates 30, their length being a little less than the normal distance between the followers 25 and 28, their upper and lower edges are straight and their vertical width is such that the plates fit loosely between the top and bottom of the housing. These latter plates are consequently free to move both longitudinally and laterally.

A pair of wedge plates 36, 37, having outer faces smooth and their inner faces notched to form a plurality of wedging surfaces 38, inclined outwardly and backwardly, are located between the two groups of friction plates and in frictional engagement with the inner member of each group. These wedging plates abut against the rearward face of the supplemental follower 28. Their length is such that they are never engaged by the rear follower 25.

Interposed between the plates 36, 37, is a wedge member 39, having both of its faces notched to form a plurality of wedging surfaces 40, 41, complementary of the wedging surfaces 38 of the members 36, 37, with which they are engaged. The wedge member 39 is constantly in abutting engagement with the follower 25, and its length is such that its forward end is spaced apart from and never engages the follower 28.

The follower 28 is centrally apertured, as

shown at 42, and within this aperture is loosely fitted a cup 43, having its open end forwardly directed and being provided with a stem 44, projecting backwardly from its closed end and being in constant abutting engagement with the wedge member 39. An expansion spring 45 is seated within the cup 43 and reacts between it and the front end of the housing extension 22. This spring is of less tension than the spring 29, and is housed within the latter.

The several shoulders of the cheek-plates 17, 18, are undercut, their bearing faces being inclined inwardly and backwardly, and the shoulders 23, 24, and the outer face of the follower 25 are complementary in form, thus interlocking with the cheek-plate shoulders and preventing the outward bowing or buckling of the cheek-plates or draft sills under the severe stresses to which they are subjected. This feature is not herein claimed as it is made the subject of a divisional application.

In use the shoulders 23, 24, of the housing and the follower 25 are normally in engagement with the cheek-plate shoulders with which they coöperate, preferably the springs having been somewhat compressed in assembling the parts. Under the influence of pulling stress the draft gear moves toward and to the position illustrated in Fig. 2 of the drawings. As the follower 25 begins to advance it carries with it the wedging member 39, compressing the spring 45. The follower 28, being sustained by the spring 29, remains stationary for a time, thus preventing the advance of the wedge members 36, 37, and consequently these members are spread by the engagement of the wedging surfaces as the central wedge member advances, forcing the friction plates 30, 35, outwardly against the side walls of the housing and increasing the frictional engagement of the various contacting faces. When the friction between the wedging surfaces exceeds the tension of the spring 29, the follower 28 moves forward, leaving the friction plates 35. Farther advance of the follower 25 brings it into contact with these plates and advances them into the housing, this advance, however, being resisted by the frictional contact of the plates 35 with the plates 30, and with the walls of the housing, as well as by the tension of both springs. As the tension of the spring 29 increases with its compression, and as this compression is transmitted wholly through the wedge members 36, 37, the central wedge member is still farther advanced relatively to its companions, thus augmenting the lateral pressure upon the friction plates and correspondingly increasing their frictional engagement. It follows, therefore, that there is a gradual augmentation of resistance to the pulling stress, commencing with the tension of the inner spring and developing by the addition of the tension of the outer spring and the constantly increasing frictional engagement of the plates, until such resistance exceeds the stress applied and the parts come to rest.

Upon the recoil the wedging member 39 is the first to move, under the influence of the spring 45, thereby reducing the friction between the plates and permitting their backward movement under the influence of the spring 29, the preponderating tension of this spring prevents a sudden marked diminution of the friction and insures a gradual release and the absorption and dissipation of the load by the friction, the action proceeding correspondingly but inversely of the action due to the application of the stress.

Under the influence of buffing stress, the parts are moved toward and to the position shown in Fig. 4. At the outset, as the housing 21 advances the inner spring 45 is compressed, the wedge member 39 being immovable because of its abutting contact with the follower 25. The housing carries with it the plates 30, because of its positive engagement therewith, and the plates 35, because of their frictional engagement with the housing walls and the plates 30. This advance movement causes the compression of the spring 29, and the consequent advance movement of the follower 28 and the wedge members 36, 37, thus forcing the friction plates laterally and increasing the friction between them and between the outer plates and the walls of the housing. The advance of the plates 35 is stopped by their contact with the follower 25, and further inward movement of the housing is resisted by the increasing tension of both springs and the increasing friction of the sliding parts. The advance movement of the friction members 36, 37, is very small and in practice, the parts being properly proportioned as to size and strength, will always be stopped by the wedging action, the follower 28 never being moved into engagement with the plates 35 by its advance and hence reaching no positive abutment.

Upon the recoil the wedge members 36, 37, move backwardly, under the influence of the lateral stress upon them, supplemented by the reaction of the spring 45 on the inner end of the housing, as the tension of the spring 29 is reduced, but the reaction of this spring upon the follower 28 prevents an abrupt release of the friction plates and hence the recoil is gradual and its stresses are absorbed by the friction. The recession of the housing involves the backward movement of the plates 30, and with them of the plates 35, until they encounter the follower 28. The spring 29 is now substantially balanced in its action, on the one hand urging

the housing backward, on the other urging the friction members 36, 37, forward to maintain the friction, this friction meantime urging the plates 35 backwardly against the follower 28. This balance of pressure by the reaction of the larger spring throws upon the smaller spring the duty of carrying back the draft rigging as a whole, except the inner wedge member, and by this means effecting the gradual release of the frictional elements.

While the principle of action in the release after buffing differs from that of the release after pulling stresses, the movements of the parts and the resulting absorption of the stresses are substantially identical, differing essentially only in that under the influence of pulling stresses the plates 35 travel substantially through the entire range of movement of the draw-bar, the plates 30 remaining stationary, while under the influence of buffing stresses the plates 30 travel through the entire range of movement of the draw-bar while the plates 35 remain almost stationary, moving only the short distance intervening between their ends and the follower plate 25, as shown in Fig. 1.

The device is simple and cheap of construction and assembly. The friction plates may be of sheet metal, our preference is for boiler plate, and machining is unnecessary. The friction plates may be as numerous as the space available and stiffness will permit, and because of their considerable number and extended surface area the frictional wear is so widely distributed as to be unappreciable except after very long service. The device is readily made of adequate strength to resist stresses far in excess of present day practice, leaving an adequate and more than adequate factor of safety. The release, while certain and quick, is, nevertheless, so gradual, and the dissipation of energy so complete, that shocks from recoil are reduced far below all possible danger of injury to the cars and their contents.

We claim as our invention—

1. A draft gear comprising, in combination, a chambered follower, a plurality of friction plates carried by and longitudinally movable with the follower, a plurality of severally-independent floating friction plates interposed between and extending beyond the first-named plates at both ends, means yieldingly carried by the chambered follower engageable with the inner ends of the floating plates, a follower opposed to the chambered follower and engageable with the extended ends of the second-named set of plates, and wedging elements independent of the friction plates interposed between groups thereof and actuated by the followers.

2. A draft gear comprising, in combination, a chambered follower, a plurality of friction plates carried by the follower, a plurality of independent friction plates interposed between and extending at both ends beyond the first named plates, a follower opposed to the first named follower and engageable with the ends of the independent plates, and a spring reacting against the first named follower and urging the independent plates toward the second named follower.

3. A draft gear comprising, in combination, a housing, a plurality of disconnected friction plates mounted within the housing and being free to move in directions perpendicular to their faces but fixed against longitudinal movement within the housing, a second set of disconnected floating plates arranged alternately of and in frictional engagement with and being of greater length than the first set of plates, a pair of followers at opposite ends of the two sets of plates, and interengaging wedging members located between two groups of the plates and engaging, respectively, the two followers.

4. A draft gear comprising, in combination, a housing, a traveling follower within the housing, a pair of plates located adjacent the median line of the housing in engagement with the follower and having wedging surfaces on their adjacent faces, a follower exterior of the housing, a plate in engagement with the last-named follower located between the first-named plates and having wedging surfaces complementary thereof, two sets of disconnected alternately-arranged friction plates grouped on opposite sides of the two first-named plates and being movable in directions perpendicular to their faces, the two sets of such plates being of unequal length, the shorter plates being secured against longitudinal movement relative to the housing, a spring interposed between the end of the housing and the first-named follower, and a spring interposed between the end of the housing and the central wedging plate.

5. A draft gear comprising, in combination, a housing having a closed end and shoulders for engaging a pair of draft lugs, a follower for engaging a second pair of draft lugs, a follower within the housing, coöperating wedging members bearing each on one of the followers, two sets of disconnected alternately-arranged laterally movable friction plates grouped on opposite sides of the wedging members, one set of friction plates being secured against longitudinal movement relatively to the housing and the other set being movable independently of the housing and being longer than the plates secured thereto, and being engageable in alternation by the two followers, a spring reacting between the inner end of the housing and the follower contained therein, and a spring bearing against the

inner end of the housing and coöperating with the wedging member engaging the first-named follower.

6. A draft gear comprising, in combination, a forward chambered follower constituting a housing, a rearward follower, an apertured follower within the housing, a spring reacting between the inner end of the housing and the apertured follower, a wedging plate bearing centrally against the rearward follower, a spring reacting between the inner end of the housing and such wedging plate, a pair of wedging plates engaging the two faces of the first-named wedging plate and engaging the apertured follower, a set of laterally movable disconnected friction plates grouped between the wedging plates and the side walls of the housing and having shoulders engaging the top and bottom walls thereof, and a set of disconnected floating friction plates arranged alternately of and being of greater length than the members of the first-named set of friction plates.

7. In a draft gear, in combination, front and rear followers engageable with the draft shoulders of a car, the front follower being chambered, two sets of longitudinally disposed friction plates of unequal length located between the followers, the plates of the shorter set being fixed against longitudinal movement as to the front follower, the plates of the longer set being engageable by the rear follower, wedging plates reacting upon the friction plates, one of the wedging plates being in contact with the rear follower, a spring reacting between such wedging plate and the forward follower, and a second spring of greater strength than the first-mentioned spring reacting between the forward follower and the friction plates engageable by the rear follower and the other wedging plate.

8. A draft gear comprising, in combination, a pair of followers engageable with the draft shoulders of the car, one of the followers being chambered, two sets of longitudinally disposed friction plates of unequal length located between the followers, the plates of the shorter set being fixed against longitudinal movement with reference to the chambered follower and the plates of the longer set being engageable with the other follower, wedging plates reacting upon the friction plates, one of the wedging plates being in contact with one of the followers, a spring reacting between such wedging plate and the other follower, a transverse plate engaging the other wedging plate and engageable with the longer set of friction plates, and a second spring of greater strength than the first-named spring reacting between the transverse plate and the follower against which the first-named spring reacts.

9. In a draft gear, in combination, a movable housing having draft lug engaging shoulders, two sets of intercalating disconnected laterally-movable friction plates inclosed within the housing, the plates of one set being locked against longitudinal movement relatively as to the housing and the plates of the other set being floating, and normally extending beyond the locked plates at both ends, wedging elements independent of the friction plates and acting laterally thereon, a draft lug engaging follower engageable with the ends of the floating plates, a transverse plate engageable with the opposite ends of the floating plates, and a spring reacting between the transverse plate and the end of the housing.

10. In a draft gear, in combination, a housing shouldered to engage a pair of draft lugs and having one end closed, a follower adapted to engage a second pair of draft lugs, a set of friction plates within the housing and anchored thereto longitudinally, a set of floating friction plates intercalating with and being of greater length than the anchored plates and engageable with the second-named follower, the two sets of friction plates being arranged in two groups, wedging plates located on the median line of the housing and between the two groups of friction plates, a follower engageable with one of the wedging elements and with the inner ends of the floating friction plates, a spring reacting between the closed end of the housing and the last-named follower, a spring of lesser tension reacting between the closed end of the housing and the wedging element coöperating with the first-named follower.

11. A draft gear comprising, in combination, a housing having cheek plate engaging shoulders, and being open at one end, a set of laterally movable friction plates carried within the housing and anchored against longitudinal movement with reference thereto, a second set of laterally movable friction plates interposed between and being of greater length than the members of the first-named set of plates, and being longitudinally movable with reference to the housing, a follower beyond the open end of the housing and engageable with the second-named set of plates, a spring reacting between the second-named set of plates and the closed end of the housing, and means for augmenting the frictional contact of the two sets of plates.

12. In a draft gear, in combination, a housing having draft-lug engaging shoulders and a spring engaging abutment, a set of laterally movable friction plates within the housing and secured against longitudinal movement relative thereto, a second set of friction plates arranged in alternation with and of greater length than the first-named set of friction plates and being free to move

longitudinally with reference to the housing and normally projecting beyond the end thereof, a follower within the housing and engageable with the inner ends of the second-named set of friction plates, a spring reacting between such follower and the abutment of the housing, a draft-lug engaging follower exterior of the housing and engageable with the second-named friction plates, and a set of coöperating wedging elements interposed between groups of the two sets of friction plates and actuated respectively by the housing and the last-named follower.

13. In a draft gear, in combination, a housing having draft-lug engaging shoulders and a spring engaging abutment, a set of laterally movable friction plates within the housing and secured against longitudinal movement relative thereto, a second set of friction plates arranged in alternation with and of greater length than the first-named set of friction plates and being free to move longitudinally with reference to the housing and normally projecting beyond the end thereof, a follower within the housing and engageable with the inner ends of the second-named set of friction plates, a spring reacting between such follower and the abutment of the housing, a draft-lug engaging follower exterior of the housing and engageable with the outer ends of the second-named friction plates, and a set of coöperating wedging plates interposed between groups of the two sets of friction plates, one of such wedging plates being engageable by the follower within the housing, the other of such wedging plates being engageable by the follower exterior of the housing, and a spring reacting between such last-named wedging plate and the abutment of the housing.

14. In a draft gear, in combination, a housing having draft lug engaging shoulders and a spring engaging abutment, a set of laterally movable friction plates within the housing and secured against longitudinal movement relative thereto, a second set of friction plates arranged in alternation with and of greater length than the first-named set of friction plates and being free to move longitudinally with reference to the housing and normally projecting beyond the end thereof, a follower within the housing and engageable with the inner ends of the second-named set of friction plates, a spring reacting between such follower and the abutment of the housing, a draft-lug engaging follower exterior of the housing and engageable with the second named friction plates, and a set of coöperating wedging plates interposed between groups of the two sets of friction plates, one of such wedging plates being engageable by the follower within the housing, the other being engaged by the follower exterior of the housing, and a spring reacting between such last-named wedging plate and the abutment of the housing, such spring being of less strength than the first-named spring.

15. In a draft gear, in combination, a housing having draft lug-engaging shoulders and being closed at one end and open at the other end, two groups of laterally-movable friction plates within the housing and anchored thereto against longitudinal movement, floating friction plates alternated with and of greater length than the first-named plates and normally projecting beyond the open end of the housing, a draft lug-engaging follower facing the open end of the housing, an apertured follower between the friction plates and the closed end of the housing, coöperating wedge elements between the groups of plates one thereof engageable by the first-named follower and the other engageable by the second-named follower, a spring reacting between the end of the housing and the second-named follower, and a spring bearing upon the end of the housing and coöperating through the apertured follower with the wedge element engageable by the first-named follower.

16. In a draft gear, in combination, a housing adapted to engage draft shoulders, friction plates carried by the housing and anchored against longitudinal movement relatively thereto, floating friction plates interposed between and of greater length than the anchored plates, a pair of followers engageable respectively with opposite ends of the floating plates, coöperating wedging elements independent of the floating plates and acting laterally upon the several friction plates, such wedging elements coöperating respectively with the two named followers, and a spring interposed between one of the followers and a portion of the housing.

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