T. L. McKEEN.

DRAFT GEAR.

APPLICATION FILED JAN. 27, 1908.

966,114.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

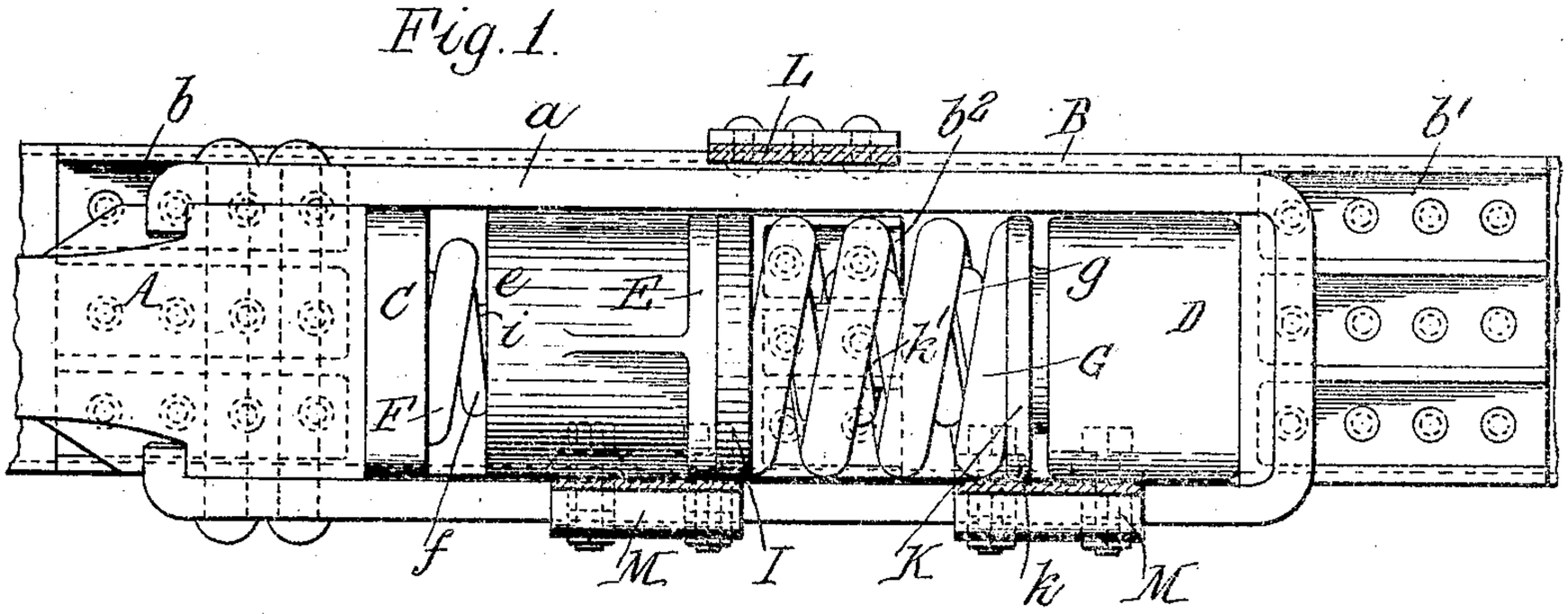


Fig. 2.

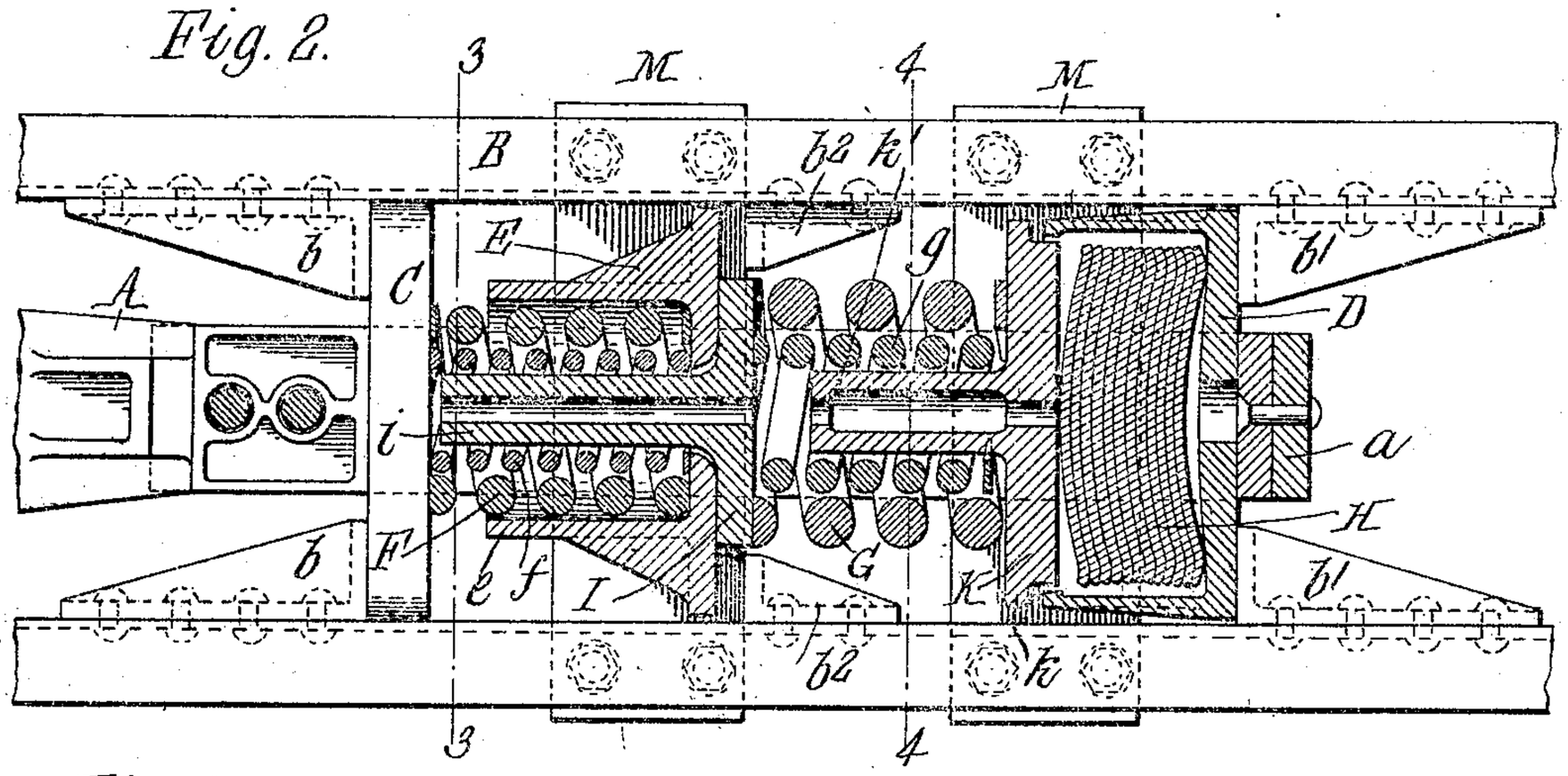


Fig. 3.

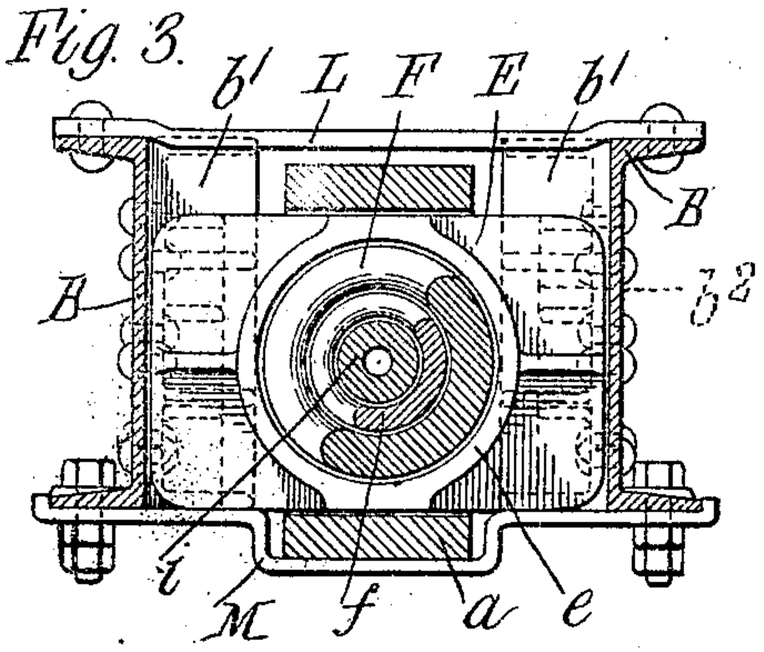
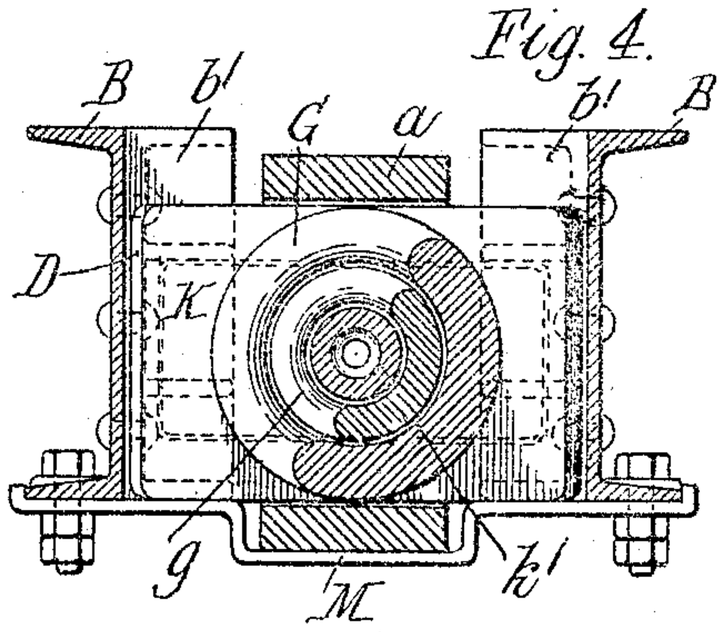


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

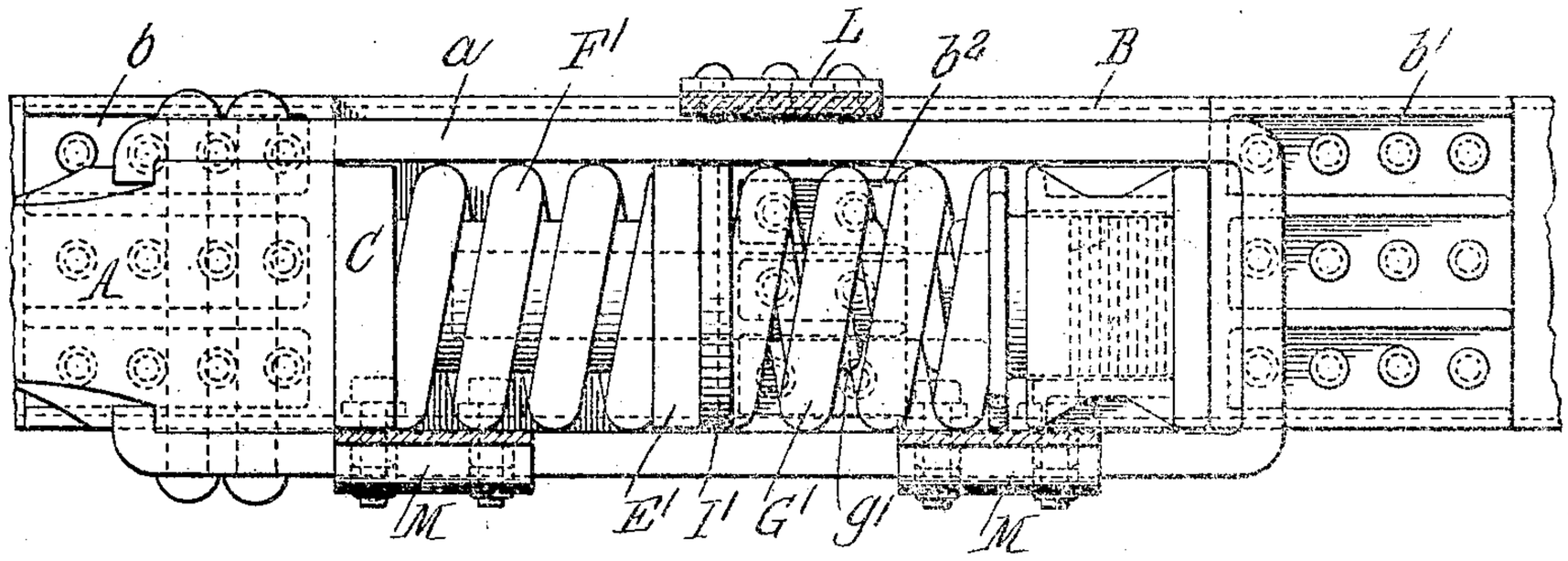


Fig. 6.

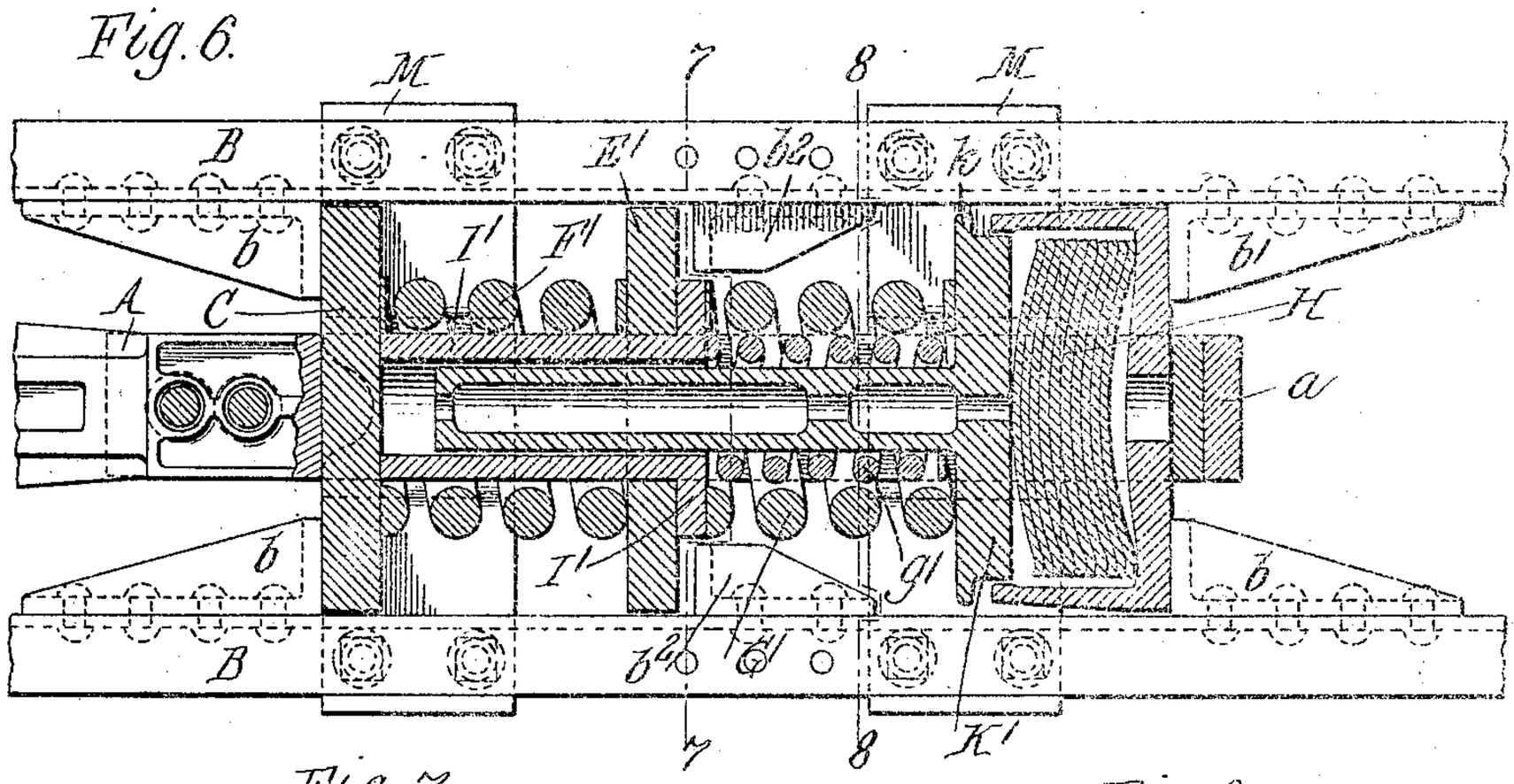


Fig. 7.

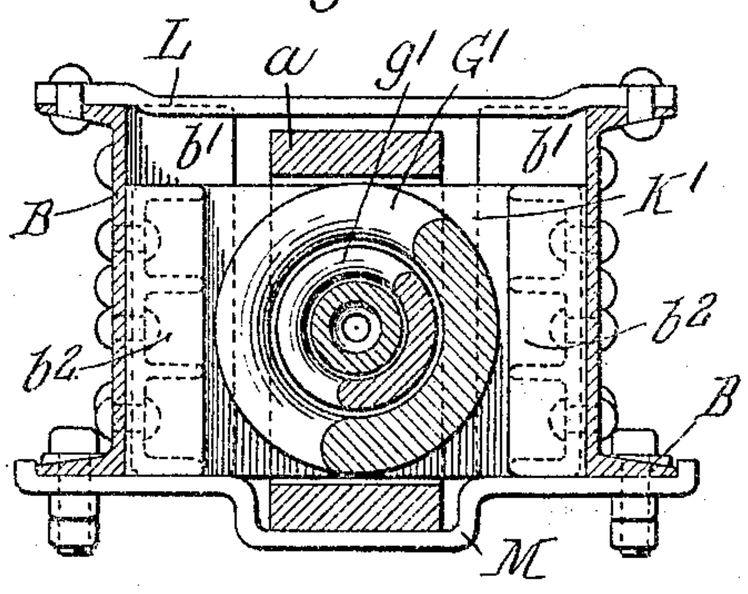
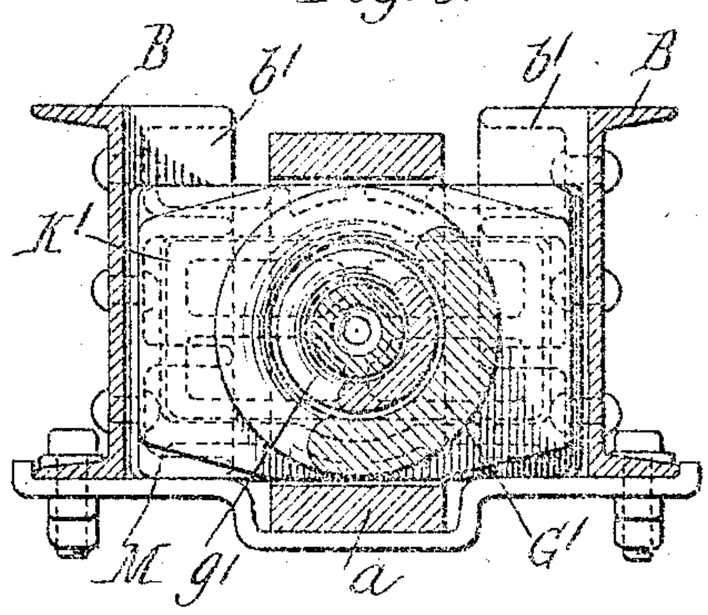


Fig. 8.



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UNITED STATES PATENT OFFICE.

THOMAS L. McKEEN, OF EASTON, PENNSYLVANIA.

DRAFT-GEAR.

966,114. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed January 27, 1908. Serial No. 412,689.

To all whom it may concern:

Be it known that I, THOMAS L. McKEEN, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented a new and useful Improvement in Draft-Gears, of which the following is a specification.

This invention relates to draft gears for railway cars and more particularly to improvements in gears of the type disclosed in my application for U. S. Letters Patent, Serial No. 405,152, filed Dec. 5, 1907, in which coil and leaf springs or spring plates are arranged one behind the other longitudinally of the car, in such manner as to allow a long travel of the draw-bar and offer a great but graduated resistance to its movement. The gear disclosed in said application produces a graduated resistance of exceedingly high final capacity, higher than is often required, but owing to the relatively great number of spring plates and the large containing boxes for the same the gear is heavier and more expensive than a gear having a lower capacity but adequate for many demands.

The primary object of this invention is to produce, by a novel arrangement of the coil and leaf springs and coöperating parts, a gear which is not as heavy and costs less to build and apply to the car than the gear disclosed in said application, but which nevertheless gives a greater travel of the draw-bar without unduly increasing the length of the gear and offers a nicely graduated resistance of high capacity to the movement of the draw-bar.

Other objects are to make the gear of such length that it can be used in draw-bar yokes employed with gears already in use; to provide means for preventing the springs from being driven solid or strained to a harmful degree; and to otherwise improve the construction of draft gears of this sort in the respects hereinafter described and set forth in the claims. To this end, two coil springs or two sets of coil springs, and a set of leaf springs are arranged one behind the other and coöperate with followers and stops so arranged that first one and then another spring comes into action and finally all act together to produce a nicely graduated or gradually increasing resistance of high final capacity to the movement of the draw-bar in either direction. The two coil springs or sets of coil springs allow a greater travel of the draw-bar than two sets of leaf springs, and with the followers which can be used with them, are lighter and less expensive than leaf springs and the containing box followers or other means which are necessitated for keeping them intact. Double coil springs consisting of the usual inner and outer light and heavy coils are preferably employed, but a single coil spring or set of single or double coil springs located side by side, could be used in the place of each double coil spring shown in the drawings without altering the general construction or action of the gear, and the term "coil spring" employed in this specification is therefore not necessarily intended to mean a single coil.

In the accompanying drawings, consisting of two sheets: Figure 1 is a longitudinal sectional elevation of a draft gear embodying the invention. Fig. 2 is a sectional plan view thereof. Figs. 3 and 4 are transverse sectional elevations thereof, in lines 3—3 and 4—4, respectively, Fig. 2. Figs. 5, 6, 7 and 8 are views corresponding respectively with Figs. 1, 2, 3 and 4, but illustrating a slightly modified construction.

Like letters of reference refer to like parts in the several figures.

Referring first to Figs. 1–4, A represents the rear portion of a draw-bar, *a* the usual yoke or loop secured to and extending rearwardly therefrom; B the car draft sills or beams, and b b' b^2 respectively the front or outer, rear or inner, and intermediate stops, lugs or abutments on the draft sills for the followers to bear against in transmitting the shocks and strains on the draw-bar to the draft sills. These parts may be of any usual or suitable construction, and it may be here stated that the gear to be described can be used with the same yoke and front and rear stops that are employed with some draft gears already in use, so that the gears can be applied to cars in place of such gears without requiring these parts to be replaced or altered.

C, D and E represent respectively front or outer, rear or inner, and intermediate followers. As usual, the followers extend transversely through the yoke, with the front and rear, or end, followers normally bearing respectively against the end stops b and b'. A flat plate can be used for one of the end followers, preferably the front

one, but the other end follower, the rear one in the gear illustrated, is preferably hollow or in the form of a box open at the front end and having a rear end wall with a transversely convexed inner face, for a purpose to be described. The intermediate follower is normally out of contact with the intermediate stops and is capable of a limited rearward movement before it is arrested by said stops. This follower preferably has a cylindrical forward extension *e* for a purpose which will hereinafter appear.

F *f* represent outer and inner coil springs arranged between and bearing at opposite ends against the front and intermediate followers within the cylindrical extension of the intermediate follower.

G *g* represent outer and inner coil springs arranged between the intermediate and rear followers, and H represents a set of leaf springs or spring plates located in the hollow rear follower. The leaf springs are preferably bowed and arranged on edge face to face, transversely of the draft gear, with the last spring of the set bearing at its ends against the opposite sides of the end wall of the rear follower. There are thus provided three springs or sets of springs arranged one behind the other longitudinally of the gear, which, for convenience, will be called the front, center and rear springs, respectively. The springs have different capacities, preferably the front spring being the weakest, the center spring the next stronger, and the rear spring the strongest.

The center spring G *g* bears at opposite ends against front and rear plungers I and K interposed between the same and the intermediate and rear followers. The front plunger I bears against the rear end of the intermediate follower and preferably has a stem *i* which extends through said follower and the front spring and terminates short of the front follower, but is adapted to bear against the same in the action of the gear. The rear plunger K enters the open end of the rear follower D and bears against the leaf springs, and it preferably has a marginal flange *k* adapted to strike the front end of the rear follower, and a center stem *k'* which projects forwardly through the center spring and is adapted to strike the front plunger to so limit the relative movement of these parts as to prevent the center and rear springs from being over strained and injured. The convexed inner face of the end wall of the rear follower also serves to prevent the leaf springs from being fully straightened out and thus injured. The cylindrical extension of the intermediate follower is adapted to strike the front follower to prevent the front spring F *f* from being driven solid. The springs are normally strained sufficiently to hold the front and rear followers against the draw-bar and end of the yoke and the other parts in the position shown in Fig. 2, and prevent lost motion or independent play of the parts.

The draw-bar yoke and parts within the same can be supported and confined by any suitable means. Transverse straps or plates L and M connecting the draft beams above and below the yoke are shown for this purpose.

The action of the gear as thus constructed is as follows: In buffing, the rear follower D is held stationary by its stops *b'* and the front follower is moved rearwardly by the draw-bar, the pressure being transmitted through the several springs, followers and plungers to the rear stops *b'*. The front coil spring F *f* being the weakest, yields first until the front follower strikes the stem of the front plunger I. In the continued movement of the draw-bar the front plunger I is pushed rearwardly, compressing the center spring G *g*. The intermediate follower and front spring move with the front plunger, and the front spring is not compressed any more until the follower is arrested by contact with the intermediate stops b^2, when the front spring will be further compressed and add its resistance to that of the center spring G *g*. When the front plunger strikes the stem of the rear plunger K, further compression of the center spring is prevented and the rear plunger is pushed rearwardly and compresses the leaf springs until the front follower C strikes the front end of the cylindrical extension *e* of the intermediate follower E and the flange *k* of the rear plunger K strikes the front end of the rear follower D. The engagement of these parts prevents straining any of the springs beyond a safe limit. When the draw-bar is pulled forward in drawing the car, the front follower C is held stationary by its stops *b* and the rear follower D is drawn forwardly by the yoke, and the leaf springs and center spring G *g* acting through the plungers K and I and intermediate follower E compress the front spring F *f* until the stem of the front plunger I strikes the front follower and prevents further compression of the front spring. In the continued forward movement of the rear follower, first the center spring G *g* and finally the leaf springs H will be compressed until the stem of the rear plunger K strikes the front plunger and the rear follower D strikes the flange *k* of the rear plunger, when the plunger and follower will be arrested and further compression of the center and rear springs prevented. As the springs back each other up, all may possibly be compressed to some extent before any one spring is compressed to the limit, but their action is practically successive, that is, one spring is compressed to the limit before the next

stronger is compressed sufficiently to allow of any considerable movement of the part pressing on it. Whether or not the action of the springs is purely successive depends on the relative capacities of the springs. This gear does not give quite as great a final resistance in pulling as in buffing, because the front spring F *f* is strained so far, but less resistance is required in pulling than in buffing, so that this is not an objection.

The two coil springs and one set of leaf springs arranged as described allow a greater travel of the draw-bar than is possible with two sets of leaf springs and one coil spring, and give nearly as great a final resistance, while three coil springs arranged in the same way as the two coil springs and one set of leaf springs, shown, would not give nearly as high a resistance and would make the gear so long as to preclude of its use on cars of standard construction.

In the construction of the gear shown in Figs. 5–8, the general arrangement of the parts is substantially as above described, but there are the following differences: The front spring consists of a single coil F′ and the central springs consist of an outer coil G′ of the same size as the front spring, and an inner coil *g′*. The intermediate follower E′ has no cylindrical stop extension, and the stem of the front plunger I′ is tubular and normally bears against the front follower, while the stem of the rear plunger K′ telescopes therein and is adapted to directly engage the front follower. In this construction the central spring G′ *g′* yields first in buffing, the front spring F′ being inactive until the intermediate follower E′, which moves with the front plunger I′, is arrested by the intermediate stops b^2, when the front spring is compressed and supplements the central spring. The stem of the rear follower arrests the front follower and so prevents both the front and central coil springs from being driven solid. This construction gives a greater initial resistance and a slightly shorter draw-bar travel than the first construction, and in pulling the front spring F′ is wholly inactive.

In this specification the term "front" has been applied to the parts at the draw-bar end of the gear, and the term "rear" to the parts at the opposite end thereof, for the sake of clearness of description, but manifestly the gear could be reversed and give fairly good results, and it is therefore not necessary that the leaf springs and box follower be located at the rear end of the gear.

I claim as my invention:

1. The combination of a draw-bar, a plurality of coil springs and a set of leaf springs arranged one behind the other longitudinally of the gear, and means whereby during a substantial movement of the draw-bar in one direction at least one of said coil springs is first partially compressed and then moved bodily during the compression of the other springs and finally all of said springs are strained to offer a graduated resistance to the movement of the draw-bar, substantially as set forth.

2. The combination of a draw-bar, a plurality of coil springs and a set of leaf springs arranged one behind the other longitudinally of the gear, said springs having different capacities of resistance, and means whereby the weaker springs are successively first partially compressed and then moved bodily during the compression of the stronger springs, to offer a graduated resistance to the movement of the draw-bar in one direction, substantially as set forth.

3. The combination of a draw-bar, a plurality of coil springs and a set of leaf springs arranged one behind the other longitudinally of the gear, end followers between which said springs are located, an intermediate follower, stops for said end and intermediate followers, and connections between said end and intermediate followers whereby during a substantial movement of the draw-bar in one direction at least one of said coil springs is first partially compressed and then moved bodily during the compression of the other springs and finally all of said springs are strained to offer a graduated resistance to the movement of the draw-bar, substantially as set forth.

4. The combination of a draw-bar, a plurality of coil springs and a set of leaf springs arranged one behind the other longitudinally of the gear, end followers between which said springs are located, said springs having different capacities of resistance and said leaf springs having the greatest capacity, and intermediate devices and connections between the same and said end followers whereby one of the coil springs is first compressed, then moved bodily while the other coil spring is compressed, then said second spring is moved bodily while the first coil spring and said leaf spring are compressed to their limit, to offer a graduated resistance to the movement of the draw-bar in buffing, substantially as set forth.

5. The combination of a draw-bar, a yoke attached thereto, end and intermediate followers arranged within said yoke, stops for said end and intermediate followers, a set of leaf springs which bear against one of said end followers, said intermediate follower being normally out of contact with its stops, two plungers arranged between said intermediate follower and said leaf springs with one plunger bearing against said leaf springs, means for moving both of said plungers positively with the other end follower, a coil spring between said plungers,

and a coil spring between said other end follower and said intermediate follower, substantially as set forth.

6. The combination of a draw-bar, a yoke attached thereto, end and intermediate followers arranged within said yoke, stops for said end and intermediate followers, one of said end followers being hollow, and said intermediate follower being normally out of contact with its stops and having a part adapted to engage said other end follower, a set of leaf springs in said hollow follower, two plungers arranged between said intermediate follower and said hollow end follower with one plunger bearing against said leaf springs, a coil spring between said plungers, a coil spring between said other end follower and said intermediate follower, a part between one of said plungers and said other end follower whereby said follower pushes said plunger, and a part between said plungers for limiting the relative movement thereof and causing one plunger to push the other, substantially as set forth.

7. The combination of a draw-bar, a yoke attached thereto, end followers arranged within said yoke, stops for said end followers, two relatively movable plungers between said end followers, an intermediate follower between one end follower and the adjacent plunger, a set of leaf springs between one end follower and the adjacent plunger, coil springs respectively between said two plungers and between the other end follower and the intermediate follower, means for transmitting movement from the last mentioned end follower to the adjacent plunger, and stops for said intermediate follower, substantially as set forth.

8. The combination of a draw-bar, a yoke attached thereto, end followers arranged within said yoke, stops for said end followers, two relatively movable plungers between said end followers, an intermediate follower between one end follower and the adjacent plunger, a set of leaf springs between one end follower and the adjacent plunger, coil springs respectively between said two plungers and between the other end follower and the intermediate follower, means for transmitting movement from one plunger to the other plunger, and means for limiting the movement of the plungers, substantially as set forth.

Witness my hand, this 25th day of January, 1908.

THOMAS L. McKEEN.

Witnesses:

C. B. Hornbeck,

E. C. Hard.