T. L. McKEEN.

DRAFT GEAR.

APPLICATION FILED OCT. 7, 1907.

987,312.

Patented Mar. 21, 1911.

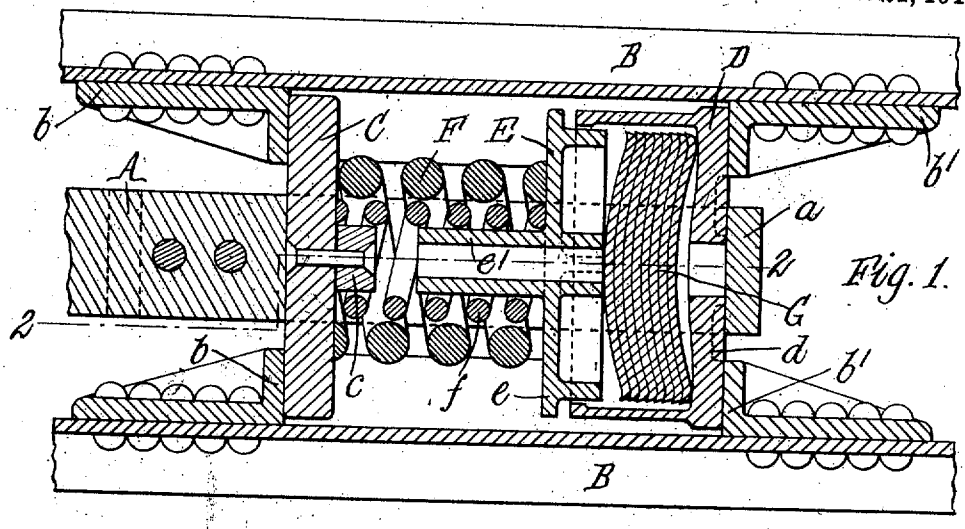

Fig. 1.

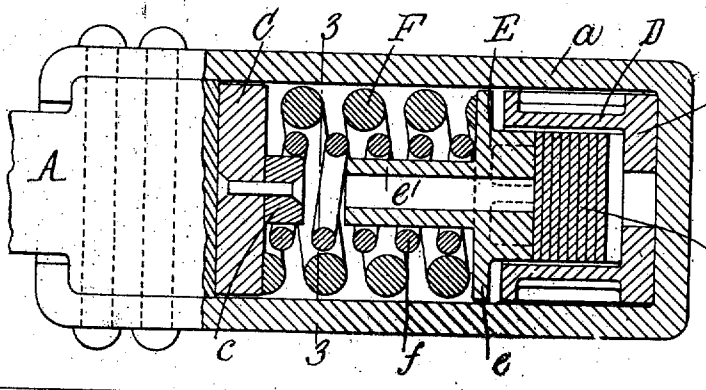

Fig. 2.

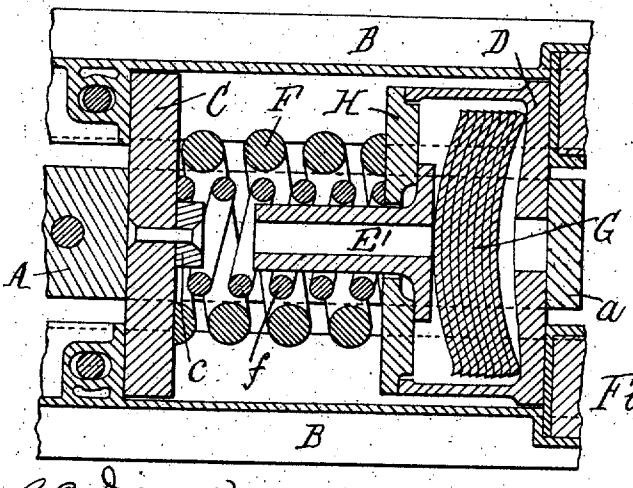

Fig. 4.

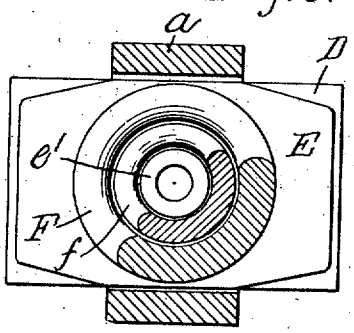

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DRAFT-GEAR.

987,312. Specification of Letters Patent. Patented Mar. 21, 1911.

Application filed October 7, 1907. Serial No. 396,130.

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 spring draft gears for railway cars, and more particularly to what are known as "tandem" gears. These tandem gears, as commonly constructed, have two coil springs or sets of coil springs arranged one in rear of the other with reference to the line of draft, and means for transmitting the pull or thrust of the draw bar to both springs or sets of springs. Such gears about double the capacity of a gear employing a single spring or set of springs of the same capacity, but they are necessarily approximately twice as long as the single gear and yet do not lengthen any the travel of the draw bar, whose movement is limited by the extent of collapse of one of the springs.

The primary object of the invention is to produce a spring gear having the maximum capacity and permitting the maximum travel of the draw bar, but which shall nevertheless occupy the minimum space longitudinally of the car, and be of exceedingly compact, simple and strong construction, and composed of the minimum number of parts.

Other objects of the invention are to provide a spring draft gear which occupies less space longitudinally of the car than a tandem spring gear employing coil springs of the standard length and capacity, and which nevertheless has greater capacity than such a tandem coil spring gear; also to so construct and arrange the parts that only three parts are required in the gear in addition to the springs; also to so construct and arrange the parts that in buffing the pressure of the springs will be applied on the extreme sides of the follower opposite to the stops or abutments on the draft sills; also to construct the gear so that the spring resistance is light at the commencement of movement of the draw bar and builds up or increases during the travel of the draw bar, thus producing an easier and smoother cushioning effect in drawing and in buffing; also to improve the construction of spring draft gears in the respects hereinafter described and set forth in the claims.

These results are attained by employing a coil spring or springs and a set of leaf springs or spring plates arranged in tandem order and operatively combined or connected in the manner hereinafter described.

In the accompanying drawings: Figure 1 is a sectional plan of a spring draft gear embodying the invention. Fig. 2 is a longitudinal sectional elevation thereof in line 2—2, Fig. 1. Fig. 3 is a transverse sectional elevation thereof, in line 3—3, Fig. 2. Fig. 4 is a sectional plan, similar to Fig. 1, of a modified construction.

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

Referring particularly to Figs. 1–3, A represents the rear portion of a draw bar, and *a* the usual yoke or strap which is secured to and projects beyond the rear or inner end of the draw bar. B represents the car draft sills or beams and *b* and *b'* respectively the front or outer and the rear or inner stops, lugs or abutments on the draft sills against which the front and rear followers of the draft gear bear in the draft and buffing action of the gear. The invention does not relate to the draw bar and draft sills and these parts may be of the usual or any suitable construction. C, D and E represent respectively the front, rear and intermediate followers. The followers all extend transversely through the yoke, as usual, the front and rear followers bearing respectively against the front and rear stops on the draft sills. The front follower C may consist of the usual rectangular plate with a spring-centering stud *c*. The rear follower is preferably of box or hollow form, as shown, having a rear end wall *d* which bears against the rear stops *b'* and an open front end. The inner face of the end wall *d* is preferably convexed transversely, as shown in Fig. 1, for a purpose to be described. The intermediate follower E is of a shape and size adapting it to enter the open front end of the rear follower, and it is provided with an edge flange or part *e* adapted to strike the front end of the rear follower to limit the movements of the intermediate and rear followers relative to each other, and with a central stud or part *e'* which projects toward and is adapted to be struck by the stud *c* on the front follower, whereby the movement of the one follower toward the other is limited, and the intermediate follower is positively moved

rearwardly by the front follower after an initial movement of the latter in buffing. As shown, the intermediate follower consists of a casting which is hollowed or cored out to lighten it. F *f* represent the outer and inner coils of a double coil spring arranged between the front and intermediate followers around the studs *c* and *c'*. This spring is preferably of the standard size and capacity used in coil spring draft gears. A single or double coil spring can be used, as preferred. G represents a set of bowed leaf springs or spring plates arranged face to face in the hollow rear follower between the rear end wall thereof and the rear face of the intermediate follower. The set of spring plates constitutes in effect a single leaf-spring consisting of a plurality of component leaves. The leaf springs extend transversely of the line of draft and are preferably arranged horizontally on edge, with the ends of the rearmost or innermost spring bearing against the opposite sides of the rear end wall of the rear follower, and the convex face of the foremost or outermost spring bearing centrally against the intermediate follower. By this arrangement the leaf springs are straightened out more or less when the intermediate follower is moved rearwardly or the rear follower is moved forwardly, and the pressure due to the resistance of the springs is exerted at the sides of the rear follower directly opposite or in line with the stops or abutments on the draft sills instead of centrally, and there is no tendency to bend or distort the rear follower, as is the case where centrally located coil springs are used. On the other hand, the pressure of the leaf springs is exerted centrally on the intermediate follower, but the pressure of the front coil springs F *f* is also applied near the center of the intermediate follower and there is little or no bending strain on this follower either. The strains are thus transmitted from the draw bar, which bears centrally on the front follower, through the coil and leaf springs to the extreme ends of the rear follower and there is little or no tendency to bend or distort any of the followers. The parts are so proportioned that the stud of the front follower will strike that of the intermediate follower and the flanges of the intermediate follower will strike the front end of the rear follower and so arrest the movement of both the front and intermediate followers, or the rear and intermediate followers, depending upon whether draft or buffing strains are applied, before either the coil springs or leaf springs can be completely collapsed or strained so as to become set.

The action of the draft gear described is as follows: In buffing, the front follower C is moved rearwardly by the draw bar A, and as the rear follower D is held from movement against the stops *b'* the coil springs F *f* are compressed and they, pressing on the intermediate follower, tend to move it and compress the leaf springs G. As the leaf springs are of greater capacity, however, than the coil springs they tend to hold the intermediate follower stationary until the pressure exerted thereon is sufficient to move it against the opposing resistance of the leaf springs. The stud of the front follower will strike that of the intermediate follower before the coil springs can be driven solid or strained so as to become set, and the intermediate follower will then be moved positively by the front follower and the leaf springs strained until the intermediate follower is arrested by its flanges striking the end of the rear follower. Thus less resistance is offered to the movement of the draw bar at the start and the resistance builds up or increases as the movement continues, thereby producing an easier and better cushioning effect than if the resistance of both springs were brought to bear at the start. In drawing, the front follower is held stationary by the stops *b* and the rear and intermediate followers are drawn forward by the yoke *a*, first compressing the coil springs and thereafter, when the intermediate follower is arrested by its stud striking the front follower, the leaf springs are compressed so that in drawing also the lesser resistance of the coil springs is first met with and then the greater resistance of the leaf springs and the car will start with less jerk than if the resistance of both sets of springs had to be overcome initially.

The coil springs are of the usual standard size and capacity and permit the same travel in this gear as in the ordinary coil spring gear, and the leaf springs enable a further movement so that by the combination of the coil and leaf springs a greater travel of the draw bar is possible than with the coil springs alone, whether arranged as in the ordinary single, tandem or twin gears. Furthermore, the leaf springs occupy less room longitudinally of the car than a second set of coil springs of standard size and capacity arranged in rear of the front springs F *f*, and yet, as they have greater capacity than such coil springs, the combined coil and leaf spring gear gives greater capacity than a tandem coil spring gear using two coil springs of standard size and capacity. The convexed end wall of the rear follower serves as an additional safeguard against the leaf springs being sprung beyond their elastic limit.

While the described relative arrangement of the springs, that is, the location of the coil springs in front or nearer to the draw bar, is preferred, it is manifest that the gear could be reversed and produce desirable results. Also the intermediate follower, in-

stead of the rear follower, could be made hollow to contain the leaf springs and telescope on the rear follower without altering the action of the gear. Likewise, leaf springs which are normally straight and require to be flexed or bowed in action could be utilized instead of the normally bowed springs shown.

Fig. 4 shows a different construction of gear employing the tandem arrangement of the coil and leaf springs, the essential difference residing in the fact that the coil springs F f, instead of bearing against the intermediate follower, bear their rear ends against a plate H which rests against the rear follower, in effect forming a part thereof, and the intermediate follower E′ passes through a hole in said plate to engage the leaf springs G. By this construction no pressure is placed upon the leaf springs until the studs of the front and intermediate followers strike and they are not brought into play at all until after an initial action of the coil springs, the action of the two sets of springs thus being purely successive, whereas in the former construction the resistance of the leaf springs is exerted at all times on the intermediate follower in opposition to the coil springs, and the two sets of springs act more or less simultaneously, depending upon their relative strength.

In both of the constructions described, a sufficient number of the leaf springs is provided to give the desired maximum resistance, and the resistance can be readily lessened if desired, by removing one or more of the leaf springs. Lost motion in the gear can be prevented in such case by replacing the springs removed with suitable filling plates.

I claim as my invention:

1. The combination of a movable member, movable rigid followers, stops for said followers, coil and leaf springs arranged between said followers one in advance of the other with respect to the direction of movement of said member, said leaf spring extending transversely of the direction of movement of said member and having greater resisting capacity than said coil spring, connections for moving one of said followers when said member is moved in either direction, and means for applying pressure to said leaf spring independently of said coil spring after an initial movement of the member, whereby both the coil and leaf springs resist movement of said member in either direction and said leaf spring acts to resist the movement of said member after an initial action of said coil spring, substantially as set forth.

2. The combination of a movable member, movable rigid followers, one of which is moved by the movement of said member in one direction, means by which the other follower is moved by the movement of said member in the opposite direction, stops for said followers, coil and leaf springs which are arranged one in advance of the other between said followers and which resist movement of said member in either direction, said leaf spring extending transversely of the direction of movement of said member and having greater resisting capacity than said coil spring, and means for limiting the compression of said coil spring and applying pressure to said leaf spring independently of said coil spring after an initial movement of said member, whereby the coil spring is protected and said leaf spring acts to resist the movement of said member after an initial action of said coil spring, substantially as set forth.

3. The combination of a movable member, movable rigid end followers, one of which is moved by the movement of said member in one direction, means by which the other follower is moved by the movement of said member in the opposite direction, stops for said followers, coil and leaf springs arranged one in advance of the other between said followers, said leaf spring extending transversely of the direction of movement of said member, a movable intermediate follower which is arranged between said coil and leaf springs and against which said springs exert pressure in opposite directions, and means for limiting the relative movement between said intermediate follower and the end follower which is adjacent to said coil spring to limit the compression of said coil spring and apply pressure to said leaf spring independently of said coil spring after an initial action of the coil spring, substantially as set forth.

4. The combination of a movable member, movable rigid end followers, one of which is moved by the movement of said member in one direction, means by which the other follower is moved by the movement of said member in the opposite direction, stops for said followers, coil and leaf springs arranged one in advance of the other between said followers, said leaf spring extending transversely of the direction of movement of said member, a movable intermediate follower which is arranged between said coil and leaf springs and against which said springs exert pressure in opposite directions, and means for limiting the relative movement between said intermediate follower and each end follower to protect both the coil and leaf springs and apply pressure to said leaf spring independently of said coil spring after an initial action of the coil spring, substantially as set forth.

5. The combination of a movable member, movable rigid end followers, one of which is moved by the movement of said member in one direction, means by which the other fol-

lower is moved by the movement of said member in the opposite direction, stops for said followers, coil and leaf springs arranged one in advance of the other between said followers, said leaf spring extending transversely of the direction of movement of said member and having a greater resisting capacity than said coil spring, an intermediate follower which is arranged between said coil and leaf springs and against which said springs exert pressure in opposite directions and which is movable to allow the bodily movement of said coil spring during the movement of said member in one direction after an initial compression of said coil spring, substantially as set forth.

6. The combination of a movable member, movable rigid end followers, one of which is moved by the movement of said member in one direction, means by which the other follower is moved by the movement of said member in the opposite direction, stops for said followers, coil and leaf springs arranged one in advance of the other between said followers, said leaf spring extending transversely of the direction of movement of said member, one of said followers being hollow and containing said leaf spring, a movable intermediate follower which is arranged between said coil and leaf springs and against which said springs exert pressure in opposite directions, said intermediate follower being adapted to strike said hollow follower to limit the compression of said leaf spring, and means for limiting the compression of said coil spring, substantially as set forth.

7. The combination of a movable member, movable rigid end followers, one of which is moved by the movement of said member in one direction, means by which the other follower is moved by the movement of said member in the opposite direction, stops for said end followers, an intermediate follower, a coil spring arranged between said intermediate follower and one end follower and bearing against the middle portion of said end follower, and a leaf spring which is arranged between said intermediate follower and the other end follower transversely of the direction of movement of said member and bears centrally against said intermediate follower and at its ends against said other end follower, substantially as set forth.

8. The combination of a movable drawbar, rigid movable end followers, one of which bears centrally against said drawbar and is moved by the movement of said drawbar in one direction, means by which the other follower is moved by the movement of said drawbar in the opposite direction, stops for said end followers, an intermediate follower, a coil spring which is arranged between said intermediate follower and the first mentioned end follower and bears against the central portions of said end follower and said intermediate follower, and a leaf spring which is arranged between said intermediate follower and the other end follower transversely of the direction of movement of said drawbar and bears centrally against said intermediate follower and at its ends against said other end follower, substantially as set forth.

9. The combination of a movable member, a movable rigid follower which is moved by the movement of said member in one direction, coil and leaf springs which are arranged one in advance of the other and which resist movement of said member, said leaf spring extending transversely of the direction of movement of said member and having greater resisting capacity than said coil spring, means for applying pressure to said leaf spring independently of said coil spring after an initial movement of said member and for limiting the compression of said coil spring, whereby said leaf spring is effective after said coil spring has been compressed to a desired maximum, a rigid device against which said leaf spring bears, and means for limiting the compression of said leaf spring, substantially as set forth.

Witness my hand, this 2d day of October, 1907.

THOMAS L. McKEEN.

Witnesses:
CHAS. W. PARKER,
C. B. HORNBECK.