C. W. SHERMAN.

FRICTION DRAFT GEAR.

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1,254,857.

Patented Jan. 29, 1918.

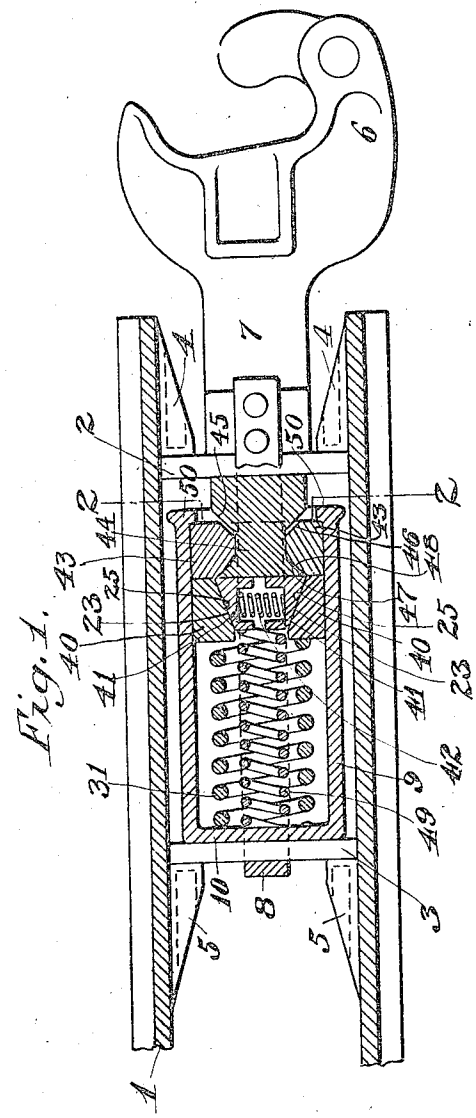


Fig. 1.

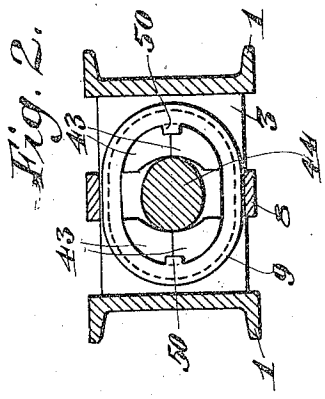


Fig. 2.

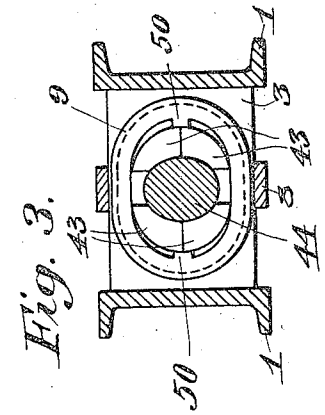


Fig. 3.

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UNITED STATES PATENT OFFICE.

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FRICTION DRAFT-GEAR.

1,254,857. Specification of Letters Patent. **Patented Jan. 29, 1918.**

Original application filed April 23, 1914, Serial No. 833,898. Divided and this application filed August 1, 1917. Serial No. 183,955.

To all whom it may concern:

Be it known that I, CLIFTON W. SHERMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Friction Draft-Gears, of which the following is a specification.

This invention relates to friction draft gears for railway cars whereby the shock upon the same during coupling and uncoupling of the cars is relieved.

The object of this invention is to produce a draft gear of this character which is comparatively simple in construction, efficient in operation, not liable to get out of order and capable of being produced at comparatively low cost.

This application is a division of an application filed by myself April 23, 1914, Serial No. 833,898.

In the accompanying drawings:

Figure 1 is a horizontal longitudinal section of a friction draft gear showing one form of my invention. Fig. 2 is a vertical transverse section taken on line 2—2, Fig. 1. Fig. 3 is a section taken on substantially the same line but showing the parts in the position which they occupy while being assembled.

Similar characters of reference indicate corresponding parts in the several views.

In its general organization this friction draft gear is like those heretofore in use and comprises side draft sills or beams 1, 1, which are arranged lengthwise and parallel in the lower part of the car body, front and rear followers 2 and 3 which are guided between said sills so as to be capable of moving forward and backward horizontally, a pair of front stops or blocks 4 secured to the inner sides of the sills and operating to limit the forward movement of the front follower, a pair of rear stops or blocks 5 arranged on the inner sides of the sills and operating to limit the rearward movement of the rear follower, a car coupler 6 provided with a draw bar or shank 7 arranged lengthwise in front of the front follower, and a yoke 8 connected with the draw bar and slidingly embracing the front and rear followers.

My improvements associated with the foregoing parts of the draft gear are constructed as follows:

9 represents an external friction member preferably constructed in the form of a cylinder which is oblong in cross section and which is arranged between the upper and lower straps of the yoke 8 so that its major axis is horizontal and its minor axis vertical and bears with its closed rear or inner end or head 10 against the rear follower while its open front end faces forwardly or outwardly.

Within the outer or front end of this friction member or cylinder are arranged in tandem or side by side in a direction lengthwise of the axis of the cylinder, two sets of friction elements which form part of my improvements. The front or outer set of these elements comprises a plurality of friction shoes 43 which engage at their lateral outer sides with the bore of the friction cylinder.

The inner or rear set of friction elements also comprises a plurality of rear friction shoes 40 which bear against the bore of the friction cylinder adjacent to opposite ends of its major axis and each provided with an inclined or beveled face 23. Between the inner or rear friction shoes are arranged the sections 41 of the inner or rear wedge, preferably two in number, which are arranged transversely side by side in a direction parallel with the major axis of the friction cylinder and each provided with an inclined or beveled face 25 engaging with the inclined faces 23 on the adjacent shoes of the inner or rear set.

Although the angle of the wedging engagement of the shoes and wedges may be varied, it is preferable to make the angle of the coöperating inclined faces 23, 25 of the rear or inner shoes and wedge sections more acute or sharp than the angle of the coöperating inclined faces 45, 46, of the front shoes and wedge, the angle of wedging engagement between the last mentioned parts being comparatively blunt or obtuse, as shown in Fig. 1.

The inner or rear set of friction shoes 40 which bear against the bore of the cylinder are engaged by wedge sections 41 which are yieldingly pressed against the inner sides of the rear shoes by means of a transverse spring 42 interposed between these wedge sections. The shoes 43 of the front set are operated on by a solid wedge member having a reduced central part or neck 44 arranged between the central parts of the front friction shoes, an enlarged front part having an

inwardly or rearwardly tapering face 45 which engages with corresponding inclined outer or front faces 46 on the front ends of the front friction shoes, and an enlarged inner or rear part having a forwardly or outwardly tapering face 47 engaging with correspondingly inclined faces 48 on the rear ends of the front friction shoes, as shown in Fig. 1. A main tension spring 31 is arranged between the rear ends of the rear friction shoes 40 and the rear head of the friction cylinder and a supplemental tension and releasing spring 49 is interposed between the rear ends of the rear wedge sections 41 and the rear head of the friction cylinder. The forward movement of the friction shoes and the parts associated therewith in the friction cylinder is limited by means of stops, shoulders or lugs 50 projecting inwardly from the front end of the friction cylinder so as to be engaged by the front ends of the front friction shoes, as shown in Figs. 1 and 2. In order to permit of introducing these friction shoes properly into the cylinder and enable the front shoes to engage with the rear sides of the stops 50 after the parts are assembled, the neck of the front wedge member is made of oblong form in cross section, as shown in Figs. 2 and 3. While introducing the front wedge and shoes into the cylinder the wedge member is so turned that its minor axis is parallel with the major axis of the friction cylinder, thereby permitting the front friction shoes to be contracted relatively to the neck of the front wedge sufficiently to pass lengthwise between the stop lugs 50 of the cylinder, as shown in Fig. 3. After the front friction shoes have been inserted in the cylinder beyond the stop lugs 50, the front wedge member is given a quarter turn so that its major axis is parallel with the major axis of the friction cylinder, thereby causing the front friction shoes to be spread and held in a position within the friction cylinder in which their outer ends project laterally beyond said stop lugs and the latter prevent the withdrawal of the front friction shoes from the friction cylinder while the parts are in this position. No separate means, such as a tie bolt, are therefore necessary to hold the shoes, wedges and cylinder of the draft gear against longitudinal displacement as has heretofore been usually necessary in this type of friction draft gears.

In the normal position of the parts, the faces 45 of the forward wedge are spaced from the inclined faces 46 of the outer or front wedge, the buffing or tension springs 31, 49 are expanded as fully as the stops 4 and 5 will permit but are still under tension to take up slack and the front and rear followers bear respectively against the front and rear stops of the draft sills, as shown in Fig. 1. Upon pushing the coupler or draw bar backwardly or inwardly together with the front follower 2 in the act of coupling two cars, the movement of the front follower is transmitted to the front wedge and also to the rear wedge sections which latter in turn bear against the front end of the supplemental tension spring 49, whereby the longitudinal movement of these parts in this direction is yieldingly resisted and cushioned. At the same time the rear wedge sections by the action of their inclined faces against those of the rear set of friction shoes, cause the latter to be pressed outwardly against the bore of the friction cylinder and increase the frictional contact therewith, which together with the resistance offered by the main spring 31 retards or cushions the inward or backward movement of the draw bar or coupler. During the initial part of the rearward movement of the two wedge units the front wedge does not engage its inclined faces with those of the front set of shoes 43 but only the inclined faces 25 of the rear wedge sections engage with the corresponding faces 23 of the rear set of shoes. This causes the rear wedge sections by their wedging engagement with the rear set of shoes to press the latter with increased frictional contact against the friction member 9 and also cause the rear wedge sections to approach each other and compress the transverse spring 42 between the same. After the initial part of the inward movement of the rear wedge sections independently of the rear shoes and while the rear wedge sections are still separated the inclined faces of the front wedge engage the corresponding faces of the front set of shoes 43 and operate not only to press the latter transversely outward but also tend to slide the same inwardly along the bore of the friction cylinder 9. The inner wedge sections 22 are preferably so designed that they at no time act as solid wedge in order to avoid splitting the cylinder by reason of the powerful acute angle of the inclined faces of these wedge sections. This action is best obtained by so determining the space between the inner wedge sections that they do not engage each other in their innermost longitudinal position into which the same are moved by the front wedge.

As the two wedge units are pushed rearwardly or inwardly, the tension upon the spring 42 interposed between the members of the inner set of wedge sections 40 is increased more or less in accordance with the strain to which it is subjected by the wedging action of these wedge sections against the inner friction shoes, thereby rendering the frictional action of the inner set of friction shoes against the friction cylinder more effective and uniform. An added advantage in making the angle of the coöperating wedging surfaces of the inner or rear set of

shoes and wedge sections more acute than the angle of the coöperating wedging surfaces of the outer or front set of shoes or front wedge, as shown in Fig. 1, is that the frictional engagement of the front and rear set of friction shoes with the friction cylinder is by this means equalized or nearly so. This is due to the fact that the angle of engagement between the rear shoes and wedges causes these shoes to be moved outwardly and grip the friction cylinder firmly while their forward movement is resisted by the heavy spring 31 before the front shoes are pressed by their companion front wedge against the cylinder. It follows therefore from this that after the rear shoes engage by an increased frictional contact with the cylinder the same offer a more rigid abutment for the front shoes so that the latter offer a greater resistance to being moved inward lengthwise and can therefore be pressed with greater force by the slower acting but greater blow resisting wedging surfaces of the front shoes and wedge sections. By this means a practically uniform pressure of increased efficiency is gradually exerted against the friction cylinder by the front and rear sets of friction shoes, whereby the strains are distributed over a greater area and the gear is rendered more durable, effective and less liable to be broken down under maximum strains.

During the initial part of the inward longitudinal movement of the wedges the movement of the friction shoes in the same direction is resisted by the longitudinally operating main spring 31 which latter is more powerful than the combined strength of the longitudinally operating release spring 49 engaging the inner ends of the inner wedge sections and the transversely operating springs 42 between the sections 40 of the rear wedge. It follows from this that the main spring 31 holds the friction shoes practically stationary so that they form an abutment against which the wedges can operate to press the shoes transversely outwardly and cause the latter to grip the cylinder with such frictional grip that the shoes offer the greatest possible resistance to a blow delivered against the same in a direction parallel with the frictional surface of the cylinder, thereby increasing the cushioning capacity of this draft gear during buffing and pulling action accordingly.

Inasmuch as the wedge sections are pushed inwardly first the inner or releasing spring 49 receives the primary or initial part of the buffing strains. As the buffing strain upon the coupler or draw bar is relaxed, both wedges are simultaneously released by reason of the tension of the releasing spring 49 against the rear wedge sections which latter in turn transmit this releasing pressure against the front wedge, and the main tension spring 31 by its resilience pushes the rear set of shoes forwardly as well as the front set of shoes through the medium of the rear shoes. The wedges by this means are promptly released so that the pressure of the shoes against the friction cylinder may be relieved and not interfere with the quick relaxation of the gear.

This cushioning operation of the draft gear when two cars are being pulled or drawn apart while coupled is substantially the same as that which occurs while coupling two cars, inasmuch as while drawing the cars the front follower 2 remains at rest against the front stops 4 and the rear follower 3 moves forwardly toward the front follower and causes the cylinder to move relatively to the friction shoes and wedges.

By constructing the friction cylinder of oblong form with its major axis arranged horizontally and transversely the extra width of cylinder is obtained to permit of introducing the wedge sections side by side between the members and each set of shoes and still keep within the standard construction and arrangement of the draft sills and other main elements of cars now in common use.

The service condition to which a friction gear is subjected may be illustrated by one car traveling five miles an hour, and again the same car traveling ten miles per hour. We have a given weight with the inertia multiplied by doubling the speed. Again, we have for illustration ten cars moving five miles per hour which may result in approximately the same inertia as one car running ten miles per hour. Ten cars moving ten miles per hour would give a combination of load and high speed of action on the draft gear. These four loads applied to any draft gear illustrates the necessity of a device that will take care of light or heavy blows under fast or slow speeds and always furnish the correct resistance or resiliency to properly cushion the cars.

It has been found that the angles of the shoes and wedge sections which give the correct resistance at a given speed of blow are not properly effective under faster or slower blows. Therefore the yielding wedge sections 40 having angles more nearly parallel to the line of travel tighten against the shoes 40 resistingly held by the heavy spring 31 causing more uniform frictional engagement with the cylinder 9 under varying speeds. As the travel of the follower advances until the wedge sections 41 are nearly closed the shoes 43 are loosely carried forward in contact with inner shoes 40 and the blunt angle 45 and further travel of the outer shoes is resisted by the combination of the longitudinal springs and inner shoes. This total resistance is sufficient to retard the travel of the shoes 40, 43 until the wedges

41, 45 advance and further increase the outward pressure on the shoes 40 without bringing the wedge sections 40 in contact with each other, thereby avoiding excessive pressure through the flat angles 23, 25.

I claim as my invention:

1. A friction draft gear comprising a friction member, a plurality of friction shoes engaging with said friction member and having inner faces and inclined outer faces, and a wedge member having a reduced neck arranged between said shoes, an inwardly tapering face engaging with the outer inclined faces of said shoes and an outwardly turned face engaging with the inner faces of said shoes, said friction member having shoulders against which the shoes bear with their front or outer ends.

2. A friction draft gear comprising a friction member, a plurality of friction shoes engaging with said friction member and having inner faces and inclined outer faces, and a wedge member having a reduced neck arranged between said shoes, an inwardly tapering front face engaging with the outer inclined faces of said shoes and an outwardly turned inner face engaging with the inner faces of said shoes, said friction member having shoulders against which the shoes bear with their outer or front ends, and said neck being oblong in cross section and adapted when turned about its axis so as to present its minor axis to said shoes to permit the latter to contract and clear said shoulders and when turned so as to present its major axis to said shoes to hold the latter in an expanded position behind said shoulders.

3. A friction draft gear comprising a friction member, a plurality of outer friction shoes engaging said friction member and having inner faces and inclined outer faces, a wedge member having a reduced neck arranged between said shoes and outwardly turned faces and inwardly tapering faces at the inner and outer ends of said neck engaging with the inner and outer faces of said outer shoes, a plurality of inner shoes engaging with said friction member, a plurality of inner wedge sections engaging their inclined faces with said inner shoes and their outer faces with said wedge member, and springs engaging with the rear ends of said inner shoes and wedge sections.

4. A friction draft gear comprising a friction member, a plurality of friction shoes engaging with said friction member and having inclined outer and inner faces, and a wedge member having a reduced neck arranged between said shoes, an inwardly tapering front face engaging with the outer inclined faces of said shoes and an outwardly tapering inner face engaging with the inclined inner faces of said shoes, said friction member having shoulders against which the shoes bear with their outer or front ends, and said neck being oblong in cross section and adapted when turned about its axis so as to present its minor axis to said shoes to permit the latter to contract and clear said shoulders and when turned so as to present its major axis to said shoes to hold the latter in an expanded position behind said shoulders.

5. A friction draft gear comprising a friction member, a plurality of outer friction shoes engaging said friction member and having inclined inner and outer ends, a wedge member having a reduced neck arranged between said shoes and tapering faces at the outer and inner ends of said neck engaging with the outer and inner inclined faces of said outer shoes, a plurality of inner shoes engaging with said friction member, a plurality of inner wedge sections engaging their inclined faces with said inner shoes and their outer ends with said wedge member, and springs engaging with the rear ends of said inner shoes and wedge sections.

CLIFTON W. SHERMAN.