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DRAFT GEAR FOR RAILROAD CAR

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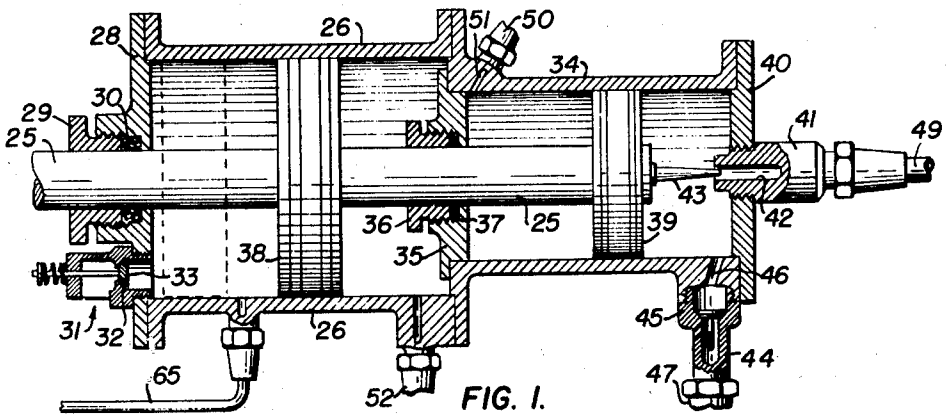


FIG. 1.

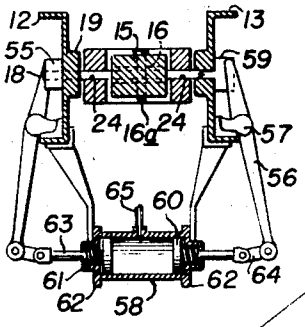


FIG. 2.

FIG. 3.

FIG. 5.

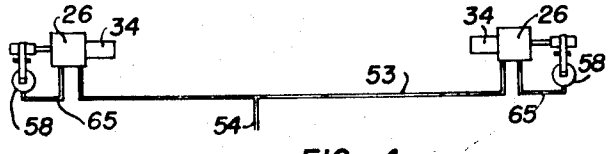


FIG. 4.

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DRAFT GEAR FOR RAILROAD CAR

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5 Claims. (Cl. 213—43)

This invention relates to railroad cars and has reference to a draft gear for absorbing the shock of impact between cars during coupling and switching operations and for eliminating slack between rolling stock.

Draft gears are intended to prevent damage to rigid structural members of railroad cars by absorbing the stresses of collision between cars during switching and coupling operations. The resiliency, or slack action, of draft gears and yokes permits a locomotive to start the cars of a train one at a time rather than simultaneously; however, once a train is in motion this slack action between coupled cars becomes a detriment to the efficient operation of a train. At grade changes or upon deceleration of the locomotive, slack is taken up successively between cars from the front to the rear of the train so that a car near the rear of the train collides with considerable impact into the car immediately ahead of it and freight in rearmost cars is thus frequently subject to damage. While it is apparent that means for absorbing shocks from emergency stops or derailment should be incorporated into the construction of railroad cars, it is equally apparent that a relatively rigid or slack free coupling system is advantageous for normal train operation.

An object of the present invention is to provide an efficient means for absorbing the shock of collision between railroad cars during switching and coupling operations.

Another object of the invention is to provide a relatively rigid coupling system for use when the train is in motion.

A further object of the invention is to provide a selective coupling system for railroad cars providing slack between cars to permit a train to be started one car at a time.

An important object of the invention is to provide means whereby the engineer of a train may alternate the coupling of a train with either a rigid or a flexible system as particular circumstances may require.

An additional object of the invention is to provide a useful and effective combination of pneumatic and hydraulic shock absorbing systems for railroad car draft gears.

A further object is to provide improved draft gear equipment which may be used in trains wherein some cars have conventional draft gears, thus permitting the gradual integration of the invention into presently used rolling stock.

These and other objects will become apparent from the following description and the accompanying drawing, wherein:

Figure 1 is a longitudinal sectional and elevational view of draft gear cylinders comprising parts of the present invention.

Figure 2 is a reduced transverse sectional elevational view taken approximately on line 2—2 of Figure 3.

Figure 3 is a broken perspective view of center sills

of a railroad car illustrating an arrangement of components of a draft gear in accordance with the invention.

Figure 4 is a diagrammatic view of a preferred pneumatic system for the invention.

Figure 5 is a broken elevation of a preferred arrangement connecting the inner end of a draw bar with a car sill.

Generally, the invention consists of an arrangement of hydraulic cylinders with graduated outlet flow for dissipating the shock of collision between railroad cars, pneumatic cylinders with restricted exhaust for providing slack and cushioning the initial pull on coupling draw bars, and pneumatically operated locking mechanisms capable of holding draw bars in an extended position to provide a relatively rigid coupling system. In its illustrated form the invention is shown in construction with components of conventional railroad cars as are presently made and used in this country. To those skilled in the art it will be apparent that the invention may likewise be adapted to other standards of construction for railroad cars.

In the drawing, sills **10** and **11** are longitudinal structural members of a railroad car. The sills **10** and **11** are conventionally disposed parallel to one another and each sill is fabricated from a steel channel beam; the sills are attached to the underside of the bed of a railroad car so that the flanges **12** and **13** of each sill project horizontally and oppositely from vertical portions in horizontal planes. A draw bar **14** extends inwardly from each end of the car between the sills **10** and **11** thereof. Each draw bar **14** is of solid steel construction and is of substantially rectangular shape with the inwardly extending portion **15** tapered. A rectangular slot **16**, parallel with the bed of the car and perpendicular to the length of the car, extends through the inward extending portion **15** of the draw bar **14** and communicates between opposite vertical sides **17** thereof. Positioned with the slot **16**, a rectangular key **18** is disposed perpendicularly to the sills **10** and **11** and the ends of the key project traversely outward from the draw bar **14**. The size of the slot **16** is greater than the traverse dimensions of the key **18** so that the draw bar **14** may be angularly displaced in both horizontal and vertical directions. The length of the key **18** is greater than the distance between the sills **10** and **11**. A vertical pin **16***a* through the draw bar **14** and key **18** substantially eliminates slack therebetween. A draft frame **19** is welded to the inner side of each sill **10** and **11** at a position thereon opposite the slot **16** through the draw bar **14**. Each draft frame **19** is rectangular in shape and is of a thickness so that opposing surfaces are regularly spaced from the respective sills **10** and **11**; sides of the draft frame **19** encompass corresponding draft frame openings, not numbered, therethrough. A longitudinal slot **20** is provided through each sill **10** and **11** which slot is positioned opposite the opening through the draft frame **19**; the length of each slot **20** corresponds with the length of each draft frame opening in the respective draft frame **19** and the height of each slot **20** corresponds with the thickness of the key **18**, the opposite ends of which project through the slots **20**.

A U-shaped yoke **21** of solid steel construction is positioned between the sills **10** and **11** with its parallel sides **22** positioned on opposite sides of the draw bar **14** and between the respective draft frames **19** and with its closed portion **23** extending inwardly beyond the inward extending end **15** of the draw bar **14**. The width of each side **22** of the yoke **21** corresponds substantially to the distance between the draw bar **14** and the draft frames **19**. Slots **24** are provided through each end of the yoke respectively which slots **24** correspond in size

with the transverse cross section of the key 18 which is positioned therethrough. A piston rod 25 is secured, as by welding, to the closed end 23 of the U-shaped yoke 21, and the rod 25 extends inwardly between and parallel with the sills 10 and 11.

A primary cylinder 26 is mounted between the sills 10 and 11 by means of brackets 27, and which cylinder receives the described piston rod 25 therethrough. The outer end of the cylinder 26 is provided with a removable cylinder head 28 having a packing gland 29 and packing 30 around said rod. A spring loaded check valve 31, having a kerf 32 in its valve element 33, is mounted in the cylinder head 28 and provides communication between atmosphere and the interior of the cylinder 26. An additional coaxially aligned secondary cylinder 34 is mounted on the inner end of the first described cylinder 26 and slidably receives the piston rod 25, but which last referred to cylinder is separated from the first by a partition 35 having a packing gland 36 and packing 37 around said rod. While not described in detail, it is to be understood that the two cylinders 26 and 34 are joined by conventional means, and that the partition 35 may be secured in place by bolts, not shown. The primary cylinder 26 and secondary cylinder 34 are provided with pistons 38 and 39, respectively, both of which are securely mounted on the piston rod 25. The inward end of the secondary cylinder 34 is provided with a cylinder head 40 having a coaxially mounted fitting 41 therein. The fitting 41 is provided with a longitudinal opening 42 therethrough for receiving a tapered projection 43 on the end of the piston rod 25, and which arrangement, as will become apparent, is for gradually closing the opening 42 in the fitting 41. The inward end side of the secondary cylinder 34 is provided with a fitting 44 having a check valve 45 therein for communication with said secondary cylinder and with the fitting 41 in the cylinder end. The fitting 44 is connected by means of a line 47 with an oil reservoir 48 which, in turn, is connected with a line 49 in communication with the coaxial fitting 41. As shown in Figure 3, the reservoir 48 remains approximately half full of oil, as indicated by means of dotted lines, and the lines 47 and 49 connected therewith are below the level of the oil. The upper portion of the reservoir 48 is provided with an air line 50 which communicates with a port 51 in the sidewall end of the secondary cylinder 34 adjacent the partition 35.

As indicated in Figure 4, each end of the railway car, not shown, is provided with an arrangement of cylinders 26 and 34 as described. The inner end of each primary cylinder 26 is provided with a fitting 52 and a connecting line 53 therebetween. The last referred to line 53 is additionally connected with a supply line 54 which extends to a source of pneumatic pressure which is selectively controlled. The latter source may be from the main reservoir in the locomotive, an auxiliary reservoir on the car and controlled by electro-pneumatic valves or low pressure air actuated valves, or any other suitable selectively controlled source of air pressure.

Figures 2 and 3 illustrate means for selectively securing the draw bars 14 in extended position as required when the train is in motion. The extending ends of the draw bar key 18, outwardly of the slots 20 in the sills 10 and 11, are provided with locking blocks 55 for coaction with the upper ends of pairs of generally vertical locking arms 56. The arms 56 are pivoted intermediate their ends outwardly of the sills 10 and 11 by means of brackets 57, the lower ends of which pair of arms are actuated by a locking cylinder 58. When in its locked or closed position the upper end of each arm 56 is received between the locking block 55 and a lug 59 mounted on its respective sills 10 and 11. Each locking cylinder 58 is provided with opposing pistons 60 which are normally urged towards the end of the cylinder 58 by means of compression springs 61 mounted in the cylinder heads 62 and around the piston rods 63 which extend outwardly

of its cylinder head. The lower ends of the locking arms 56 are pivotally connected with the outer ends of the piston rods 63 by pivoted links 64. The outer end of each primary cylinder 26 is connected with the center of the locking cylinder by means of a connecting line 65. As shown in Figure 1, the last referred to connection with the primary cylinder 26 is intermediate the ends thereof and at a distance from the outer cylinder head 28 to permit passage from the supply line 52 to the connecting line 65 when the piston 38 is in its outermost position.

When switching and connecting cars, the supply line 54 is closed and the line 53 is open and connects corresponding ends of the primary cylinders 26. Thus, when a draw bar 14 at one end of the car moves inwardly, the other moves outwardly. The action of the piston 39 in the secondary cylinder 34 has a cushioning effect against the inward thrust of the draw bar 14. As the piston 39 moves inwardly, and by reason of the tapered projection 43 and action of the same in the opening 40 of the inner end fitting 41, the flow of oil to the reservoir 48 is gradually diminished. The connecting line 50 from the reservoir 48 to the outer end of the secondary cylinder 34 relieves the vacuum which would otherwise be created. During the inward travel of the draw bar 14 relief is provided in the outer end of the primary cylinder 26 by the check valve 31. When the thrust on the draw bar 14 is outward, as when a coupling has been made and the car is being pulled, the oil in the reservoir 48 returns to the inner end of the secondary cylinder 34 by way of the connecting line 47, the fitting 44 in the end of said cylinder and through the check valve 45. During the pulling operation, the valve element 33 in the check valve 31 on the outer end of the primary cylinder 44 is closed, but by reason of the kerf 32 therein the primary piston 38 moves outwardly, but at a relatively slow rate.

When the train is in motion and traveling at high speeds, the primary piston 38 is adjacent the outer cylinder head 28, as shown by means of dotted lines in Figure 1. Pneumatic pressure is then provided through the line 54—53, through the fittings 52, through the primary cylinders 26, and thence through connecting lines 65 to the locking cylinder 58. The outward action of the locking cylinder pistons 60 moves the upper ends of the locking arms 56 inwardly to engage the inner ends of the locking blocks 55. The upper ends of the arms 56 are then positioned between the referred to locking blocks 55 and the lugs 59 on opposite sides of said arms. In this position the draw bars 14 are locked in their extended positions, thereby providing longitudinal rigidity between the cars while the same are in motion. By reason of the dimensions of the slots 16 in the inner ends of the draw bars 15, vertical and horizontal movement is provided to accommodate relative turning of the cars when passing over curved or irregular track.

By releasing the pressure in the supply line 54—53, and thereby the action on the locking cylinder pistons 60, the latter are moved inwardly by the springs 61 and release the locking blocks 55 mounted on the keys 18. Thus, the cars are relieved of the rigid action therebetween and the cushioning action of the primary and secondary cylinders again takes place.

The invention is not limited to the exemplary construction herein shown and described, but may be made in various ways within the scope of the appended claims.

What is claimed is:

1. In a railway car having a pair of parallel sills extending lengthwise of the bed thereof, a draft gear at each end of said car, each said draft gear comprising a draw bar positioned between the end portions of said sills and extending outwardly of the ends thereof, a yoke connected with the inner end of said draw bar, elongated slots in said sills opposite the inner end portion of said draw bar and said yoke, a key extending through said yoke and said draw bar and through the slots in said sills, the width

of said key being less than the length of said slots, a fluid pressure cylinder mounted between said sills inwardly of the inner end of each of said draw bars, the longitudinal axis of said cylinder being parallel with the longitudinal axis of said sills, a piston within said cylinder, a piston rod connecting said piston with said yoke, a fluid pressure line connected with both said cylinders at the ends thereof inwardly of said pistons, and a source of controllable pressure connected with said fluid pressure line.

2. In a draft gear for a railway car as defined in claim 1, the construction comprising a check valve in the end of said cylinder adjacent said draw bar, the element of said valve being positioned to permit rapid intake from atmosphere into said cylinder and said element having a kerf therein to permit slow release of air from said cylinder to atmosphere.

3. In a railway car having a pair of parallel sills extending lengthwise of the bed thereof, a draft gear at each end of said car, each said draft gear comprising a draw bar positioned between the end portions of said sills and extending outwardly of the ends thereof, a yoke on the inner end of said draw bar, elongated slots in said sills opposite the inner end portion of said draw bar and said yoke, and through the slots in said sills, a key extending through said yoke and said draw bar and through said slots in said sills, the width of said key being less than the length of said slots, a cylinder mounted between said sills inwardly of the inner end of said bar, the longitudinal axis of said cylinder being parallel with lengths of said sills, a piston within said cylinder, a piston rod connecting said piston with said yoke, a pneumatic line connected

with both said cylinders at corresponding ends thereof, and a source of controllable pressure connected with said pneumatic line.

4. In a draft gear for a railway car as defined in claim 1, the construction comprising a block on each end of the key outwardly of and adjacent the outer sides of said parallel sills, a lug on each said sill at the inner end of each said slot and located to engage said blocks when said key and said draw bar are in their retracted positions, a vertical arm pivotally mounted intermediate its end on each said sill, corresponding ends of said arms being snugly positioned between said lugs and said blocks when the latter are in their fully extended position.

5. In a draft gear for a railway car as defined in claim 4 and wherein said locking arms depend beneath said sill, the construction including a locking cylinder transversely mounted on and beneath said sills, a piston in each end of said locking cylinder, a piston rod connecting each said piston with a depending end of one said arm, and a supply line connected with said locking cylinder intermediate the ends thereof and between said pistons.

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