May 3, 1966 K. G. EMPSON 3,249,240

DRAFT GEAR

Filed April 21, 1964

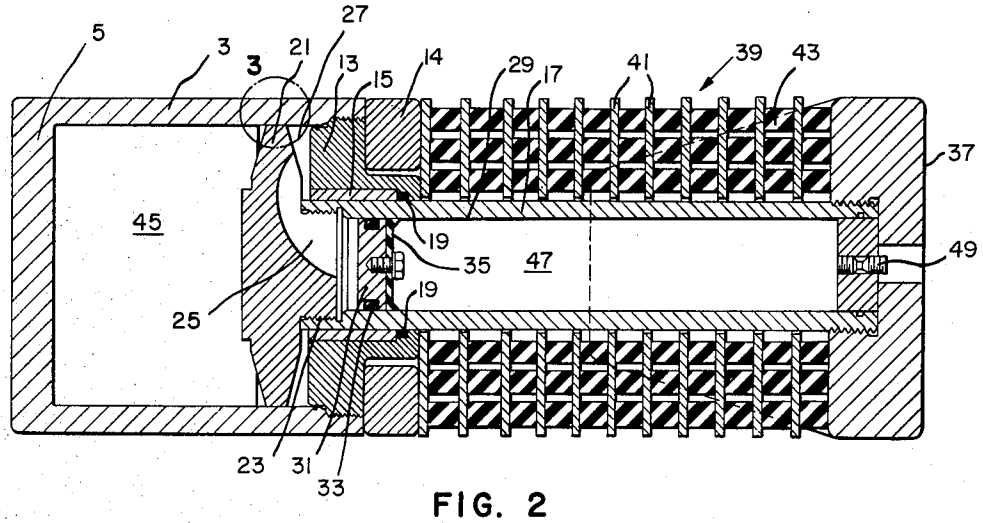


FIG. 2

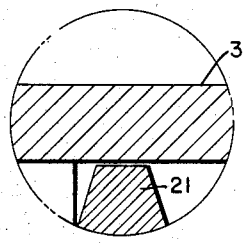


FIG. 3

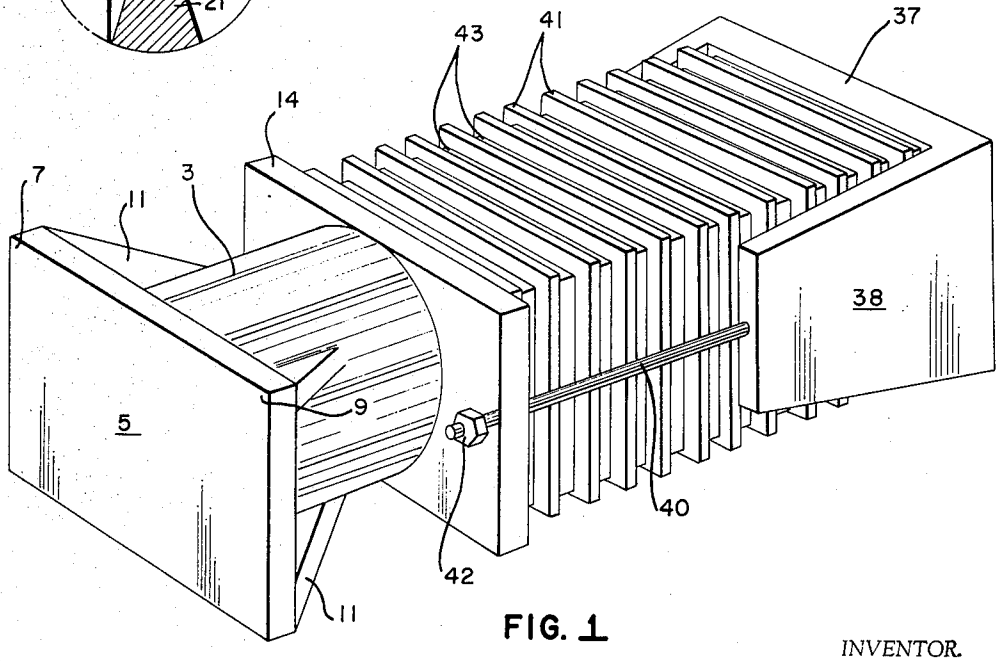


FIG. 1

INVENTOR.
KENNETH G. EMPSON

BY Eckhoff and Slick

ATTORNEYS

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DRAFT GEAR

Kenneth G. Empson, 1132 N. 7th St., San Jose, Calif.

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This invention relates to a railroad draft gear and more particularly relates to a combination of rubber spring and hydraulic draft gear which will fit into the pocket of the yoke of a railroad car.

In my co-pending application, Serial No. 186,923 filed April 12, 1962, I described and claimed a draft gear having two sets of rubber springs wherein the draft and buff strokes could be individually varied. Although this is a highly advantageous structure, in many instances a less complex structure will suffice wherein a single set of rubber springs serves both in buff and draft.

It is, therefore, an object of the present invention to provide a draft gear having a single rubber spring portion combined with a hydraulic portion.

Another object of this invention is to provide a draft gear having rubber springs of high mechanical capacity so that the unit will not close going either up or down a steep gradient.

A further object of the invention is to provide a draft gear having a fast recovery after impact even though there may be considerable pressure on the unit.

Another object of this invention is to provide a combination of hydraulic and rubber spring system in a railroad draft gear wherein the hydraulic system will absorb impacts and shocks and maintain control over the rubber springs so that recoil is reduced to a fast, smooth return to the unstressed condition.

A further object of this invention is to provide a hydraulic draft gear having a relatively low hydraulic pressure due to its large piston area so that the seals have a long life.

Other objects will be apparent from the specification which follows.

The draft gear of the present invention is adapted to fit within the pocket of a railroad car sill wherein the pocket is defined by side sills and forward and rear stops and wherein the draft rigging includes a yoke fitting around the draft gear. The back of the yoke rests on the rear element of the draft gear and the yoke is connected to a coupler and the back end of the coupler bears against the front end of the draft gear. Thus, in draft, the yoke tends to compress the draft gear against the forward stops while in buff the rear of the coupler bears against the front end of the draft gear tending to compress it against the rear stops. Thus, the draft gear of the present invention tends to compress in either buff or draft and to assume an uncompressed form under stationary conditions. It will be obvious from the description that follows that the draft gear of the present invention can be mounted in the pocket in either direction. Thus, either of the cylinder end or the rubber spring end can face outwardly when mounted on a railroad car.

In the drawings forming part of this application:

FIGURE 1 is a perspective view of a draft gear embodying the present invention.

FIGURE 2 is a sectional view of the draft gear shown in FIGURE 1.

FIGURE 3 is an enlarged view of that portion of the structure which is shown enclosed within the circle on FIGURE 2.

Turning now to a description of the drawing by reference characters, the draft gear of the present invention has a cylinder 3 having a closed end 5, the end 5 having shoulders 7 and 9 extending beyond the cylinder 3 and having re-enforcing members 11. It will be understood

that the end 5 with shoulders 7 and 9 is of such size as to fit within the pocket of a railroad draft gear.

The opposite end of the cylinder 3 is threaded into a cap 13 having an inner bushing 15 adapted to receive piston rod 17. Center plate 14 fits around the cap 13. A seal 19 provides an oil-tight sliding connection between piston rod 17 and the bushing 15. A piston 21 fits in the cylinder 3 and is attached to the piston rod 17 by threads 23. Piston 21 forms a loose fit in cylinder 3 so that hydraulic fluid can flow around the edge of the piston. The piston 21 is provided with a passage 25 so that oil from that portion of the cylinder which is designated 27 can enter the hollow stem of the piston rod 17. In the form illustrated, the passage 25 is formed by a saw kerf, although it will be obvious that the passage could be formed in other ways. The inner surface 29 of the hollow piston rod 17 forms a smooth cylinder and a free-floating piston 31 is provided in this space. The piston 31 is provided with an oil seal 33 and an air seal 35.

The opposite end of piston rod 17 is threaded into the second end plate 37. Mounted between the end plate 37 and the center plate 14 are a plurality of rubber springs generally designated 39. These springs are of the general structure described in my co-pending application above referred to and comprise a series of metal plates 41 with rubber discs or rectangles 43 interposed between each pair of plates. Both the metal plates and the rubber springs have hollow centers and the piston rod 17 fits loosely into the hollow centers.

The end 37 has an ear 38 on each side thereof in which studs 40 are threaded. The studs 40 pass through unthreaded holes in the plate 14 and have nuts 42 at the ends thereof. Thus, the studs 40 on each side of the draft gear hold the device in assembled relationship yet do not interfere with the compression of the device.

The device shown in FIGURE 2 is in the unstressed condition wherein the piston 21 is to the extreme right with the space 45 behind the piston as well as the space 27 in front of the piston filled with oil or other suitable hydraulic fluid. The hollow center of the hollow piston rod 17, designated 47, is filled with air or with an inert gas such as nitrogen and the chamber sealed by means of a plug 49. As pressure is brought between the two ends 5 and 37 the rubber springs are compressed and simultaneously the piston 17 carrying piston 21 moves to the left and, since the piston 21 forms a fairly loose fit in the cylinder 3, oil flows around its edges into the space 27. However, since the piston rod 17 is of substantial size, compensating means must be provided for the change in volume as the piston rod 17 moves into the space 45. This is accomplished by means of the passage 25 which allows some of the oil which has flowed around the piston into the space designated 27 to flow into the space in front of the floating piston 31. This drives the floating piston 31 to the right compressing the gas in the space 47. In either buff or draft, the draft gear is compressed so that pressure is built upon the springs 43, yet the action of the hydraulic fluid flowing around the piston absorbs substantially all of the shock. When pressure is released, the rubber springs restore the parts to the positions shown in the drawings.

It is preferred that the opening leading from the piston to the center of the hollow piston rod be located in that face of the piston which is attached to the rod, as illustrated. However, it will be obvious that the device would also be operative if the opening led from the opposite face of the piston but that in this event the opening must be of a very small size since it would be in parallel with flow around the edge of the piston.

Although a floating piston has been shown as the means for compensating for the change of volume within the

cylinder as the piston rod goes into the cylinder, it is obvious that other means can be used such as the employment of a metal bellows or a flexible diaphragm.

I claim:

1. A draft gear for railroad draft rigging, said draft gear fitting with the pocket of a railroad car comprising in combination:

(a) a first end plate;
(b) a second end plate;
(c) a hydraulic cylinder attached to the first end plate;
(d) a first piston in the hydraulic cylinder;
(e) a plurality of rubber springs between the first and second end plates, said springs having hollow centers;
(f) a hollow piston rod attached to the first piston at one end thereof and attached to the second end plate at the other end thereof, said piston rod fitting with the hollow centers of the rubber springs;
(g) a hydraulic fluid in the hydraulic cylinder;
(h) a gas in the hollow piston rod;
(i) said first piston forming a loose fit in said hydraulic cylinder whereby said hydraulic fluid can be caused to flow around the edges of said cylinder;
(j) means whereby the hydraulic fluid can flow from the cylinder into the hollow piston rod, thereby compressing the gas;
(k) and means for keeping the hydraulic fluid from mixing with the gas.

2. A draft gear for railroad draft rigging, said draft gear fitting with the pocket of a railroad car comprising in combination:

(a) a first end plate;
(b) a second end plate;
(c) a hydraulic cylinder attached to the first end plate;
(d) a first piston in the hydraulic cylinder;
(e) a plurality of rubber springs between the first and second end plates, said springs having hollow centers;
(f) a hollow piston rod attached to the first piston at one end thereof and attached to the second end plate at the other end thereof, said piston rod fitting with the hollow centers of the rubbers springs;
(g) a hydraulic fluid in the hydraulic cylinder;
(h) a gas in the hollow piston rod;
(i) said first piston forming a loose fit in said hydraulic cylinder whereby said hydraulic fluid can be caused to flow around the edges of said cylinder;
(j) an opening on the side of said piston, said opening extending from the face of the piston into the hollow center of said piston rod, whereby the hydraulic fluid can flow from the cylinder into the hollow piston rod, thereby compressing the gas;
(k) and means for keeping the hydraulic fluid from mixing from the gas.

3. A draft gear for railroad draft rigging, said draft gear fitting with the pocket of a railroad cam comprising in combination:

(a) a first end plate;
(b) a second end plate;
(c) a hydraulic cylinder attached to the first end plate;
(d) a first piston in the hydraulic cylinder;
(e) a plurality of rubber springs between the first and second end plates, said springs having hollow centers;
(f) a hollow piston rod attached to the first piston at one end thereof and attached to the second end plate at the other end thereof, said piston rod fitting with the hollow centers of the rubber springs;
(g) a hydraulic fluid in the hydraulic cylinder;
(h) a gas in the hollow piston rod;
(i) said first piston forming a loose fit in said hydraulic cylinder whereby said hydraulic fluid can be caused to flow around the edges of said cylinder;
(j) a second piston in said hollow piston rod;
(k) means whereby the hydraulic fluid can flow from the cylinder into the hollow piston rod, thereby compressing the gas;
(l) and means on said second piston for keeping the hydraulic fluid from mixing with the gas.

4. The structure of claim 3 wherein the means for preventing the hydraulic fluid from mixing with the gas comprises an oil seal and an air seal.

References Cited by the Examiner

UNITED STATES PATENTS

2,985,319	5/1961	Simmons	213—43
3,031,089	4/1962	Spencer et al.	213—43
3,033,384	5/1962	Zanow et al.	213—43
3,135,394	6/1964	Empson	213—43
3,150,866	9/1964	Peterson	267—1
3,164,264	1/1965	Price et al.	213—43

ARTHUR L. LA POINT, *Primary Examiner.*

MILTON BUCHLER, *Examiner.*

B. FAUST, *Assistant Examiner.*