Aug. 5, 1930. B. S. DICKERSON 1,772,387

DRAFT GEAR FOR TRAINS

Filed Dec. 27, 1927 3 Sheets-Sheet 1

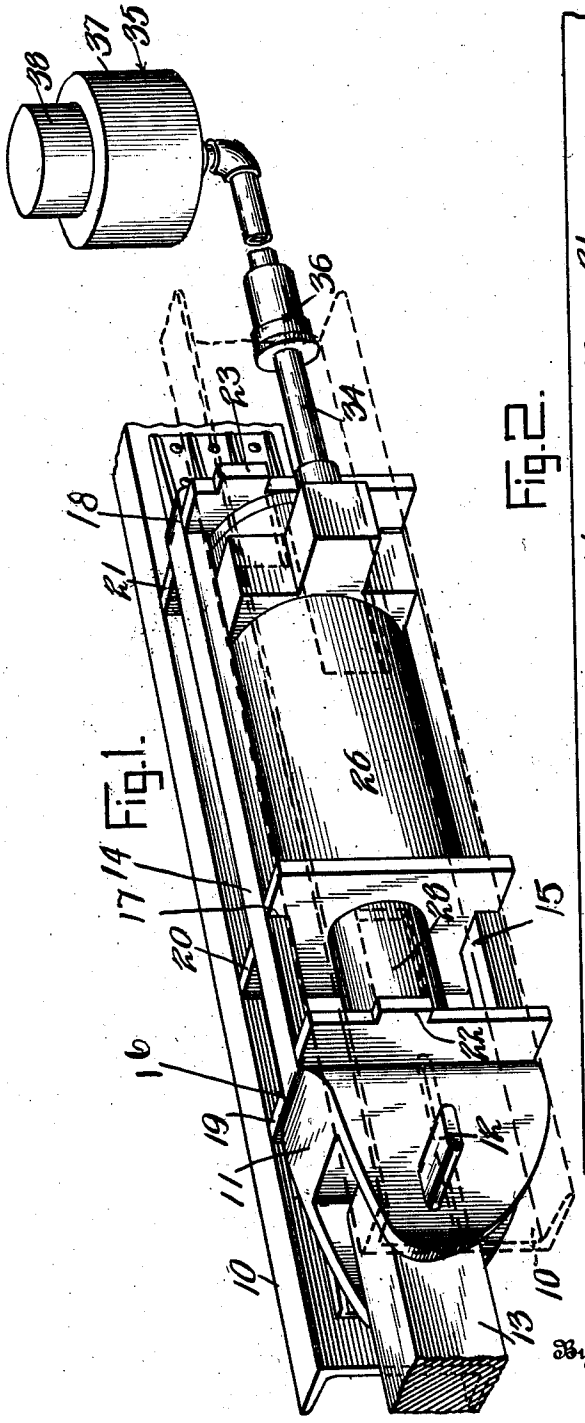


Fig. 1.

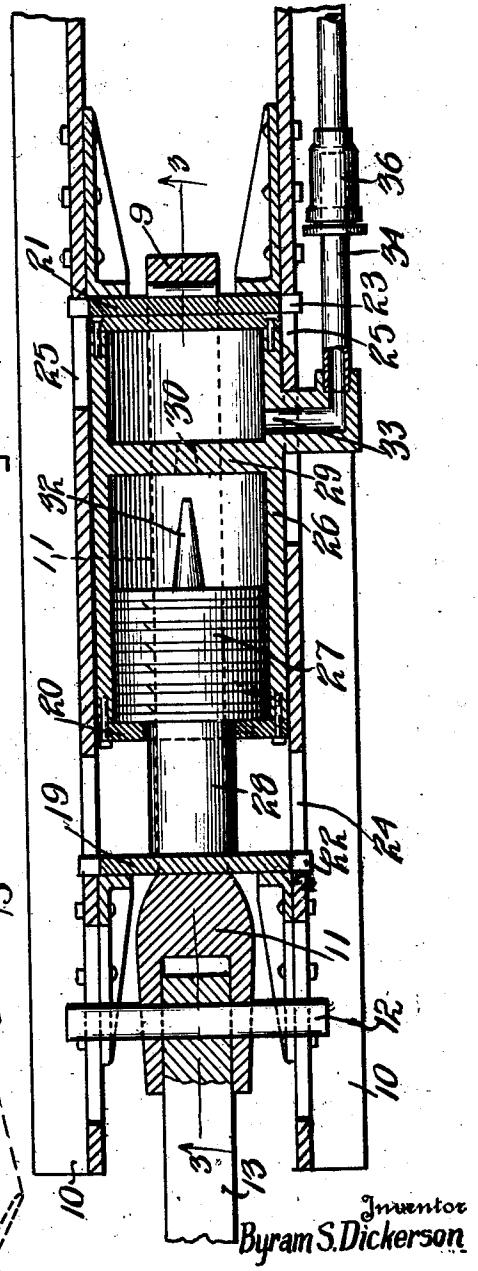


Fig. 2.

Inventor
Byram S. Dickerson

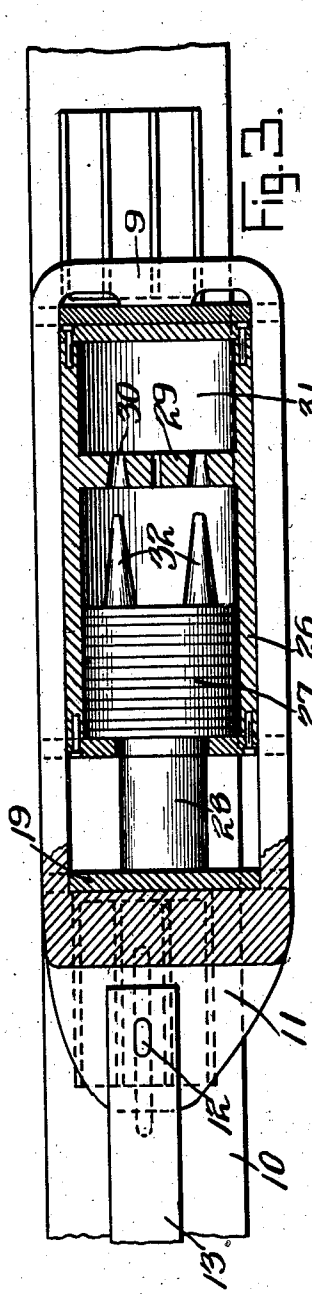
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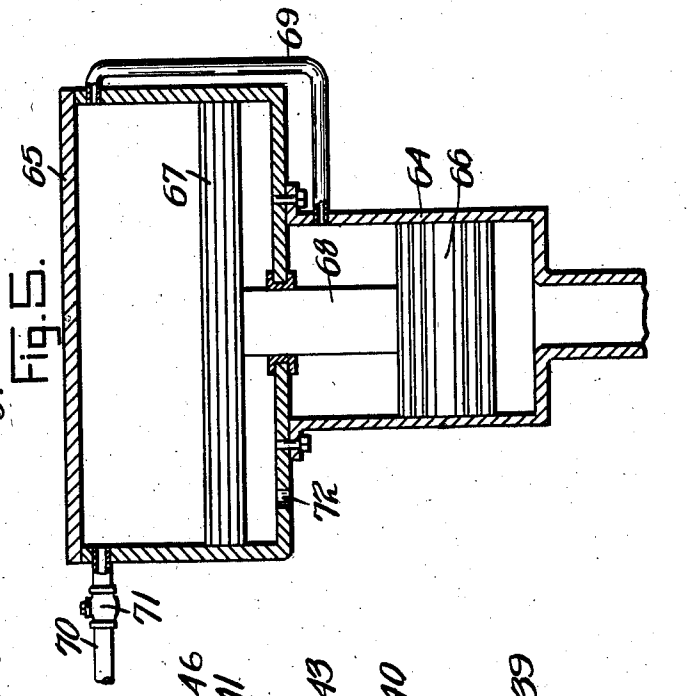
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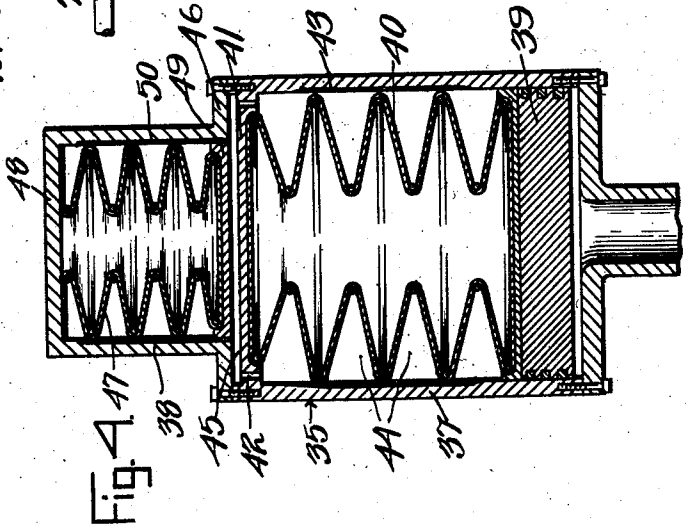
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DRAFT GEAR FOR TRAINS

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Inventor
Byram S. Dickerson

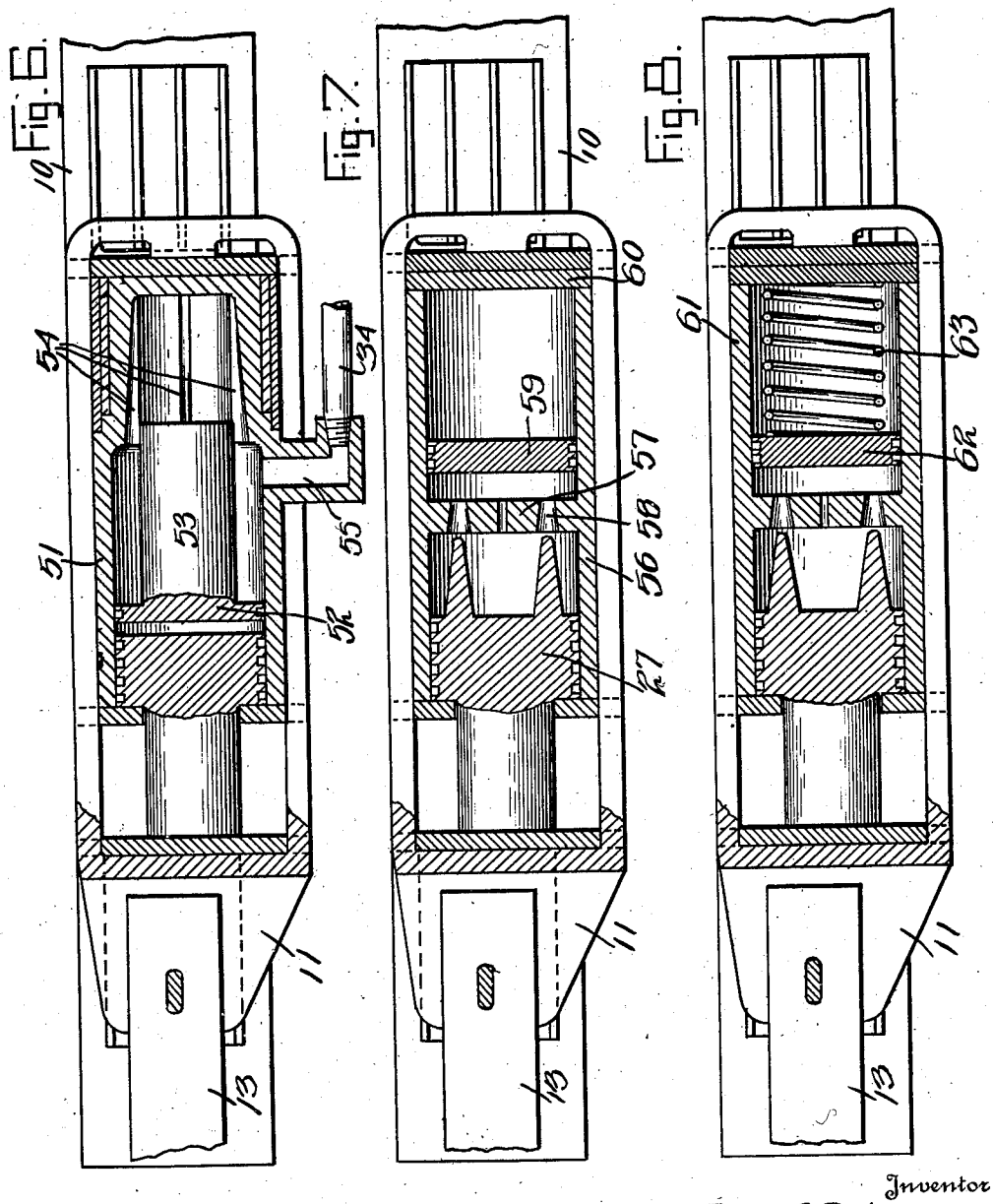
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Attorney

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DRAFT GEAR FOR TRAINS

Filed Dec. 27, 1927 3 Sheets-Sheet 3



Inventor
Byram S. Dickerson

By

Attorney

Patented Aug. 5, 1930

1,772,387

UNITED STATES PATENT OFFICE

BYRAM S. DICKERSON, OF WASHINGTON, INDIANA

DRAFT GEAR FOR TRAINS

Application filed December 27, 1927. Serial No. 242,759.

My present invention is in the nature of an improvement upon that disclosed in Letters Patent of the United States 1,470,153, granted to Byram S. Dickerson, October 9, 1923 and relates to draft gears for trains. The prime object of the invention is the provision of means in connection with draft appliances of a train for taking up slack or lost motion between the various units making up a train, and for maintaining a certain resilient state while the train is in motion on a track of variant grades and during sudden changes in speed.

A further object of the invention is to provide means whereby an engine may start a heavy train without the necessity of gathering slack, as is common, and to receive and cushion the impact of cars when colliding by virtue of the various resilient features embodied in the device.

A further object of the invention is to provide a draft arrangement that will transmit the energy of the draw bar force of the engine of the train, and which will function in such a manner that the increasing momentum of the moving engine will be transmitted to the different units of the train in proportion to the resistance encountered, thus avoiding the development of destructive strains in the draft gear and car frame.

A further feature of the invention is the provision of a combined air and liquid cushion, means for receiving the various impacts, means being provided for gradually increasing the cushioning effect of the liquid incident to the termination of the motion of the parts directed against the fluid.

Further objects and advantages of the invention will become apparent as the description proceeds.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a perspective view of the invention showing the draft appliance attachments, yoke and car sills,

Figure 2, a horizontal sectional view of the device,

Figure 3, a vertical section on line 3—3 of Fig. 2,

Figure 4, a detail sectional view of the pressure cylinder,

Figure 5, a detail sectional view of a modified form of pressure cylinder, and

Figures 6, 7 and 8 are longitudinal vertical sectional views of modified forms of the device.

In the drawings numeral 10 indicates the car sills such as are commonly used on railway cars and coaches. Between the sills is slidably mounted the usual form of yoke 11. A pin 12 connects this yoke to a draw bar 13. The yoke has upper and lower beams 14 and 15 which slidably engage notches 16, 17 and 18 in plates 19, 20 and 21. The plates 19 and 21 have ears 22 and 23 which extend through slots 24 and 25 in the car sills 10. The plates 19 and 21 have an axial movement which is limited by the ears 22 and 23 engaging the ends of the slots 24 and 25. Within the yoke 11 is a cylinder 26 having a piston 27 slidably mounted at one end thereof and a piston rod 28 projecting through the end. The end of the piston rod 28 abuts against the inner face of the plate 19. Fixed within the cylinder 26 is a partition wall 29 through which are formed ports 30 for the passage of fluid. The cylinder is filled with liquid 31 preferably oil. Attached to one end of the piston 27 are cone-like projections 32 so arranged that before the completion of the stroke of the piston, they will enter the ports 30 and gradually cut-off the flow of liquid through the ports and increase the pressure against the pistons. The ports are preferably tapered so as to conform more or less to the taper of the projections 32. The cylinder has an opening 33 in the end opposite the piston 27 to which is connected a pipe 34. This pipe leads to a pressure chamber 35. A slip joint 36 in the pipe 34 provides for an axial movement of the pipe with respect to the pressure chamber.

The pressure chamber is shown in detail in Fig. 4. This chamber consists of two cylinders 37 and 38. Within the cylinder 37 is a piston 39 which forms a separate movable wall between the liquid which is forced into

the cylinder through the pipe 34, and a hermetically sealed air or gas container 40. The gas container 40 is of bellows-like construction made of rubber or fabric or other suitable material and resembles a Japanese lantern with the outer and inner extremities of the fold properly reenforced so that under varying pressures it will not be distorted in form but will extend or contract along its vertical axis. One end of the bellows is fastened to the piston 39 and the other end is fastened to the fixed end wall 41 of the cylinder 37. The wall 41 has perforations 42 therethrough. The inner side of the wall of the cylinder 37 also has longitudinal passages 43. The outer folds of the bellows are filled with a liquid 44. Upon contraction of the bellows the longitudinal passages 43 allow the oil to pass between the edge of the bellows and the cylinder wall and the ports 42 allow the liquid to pass into a chamber 45. This chamber is formed between the cylinder end 41 and a flange 46 on the auxiliary cylinder 38. This auxiliary cylinder 38 is attached to the cylinder 37 and encloses also an auxiliary hermetically sealed air or gas container 47. One end of this container is fastened to the outer end 48 of the cylinder 38 and the other end is attached to a piston 49. This piston is slidably mounted in the cylinder 38. The gas container 47 is a bellows similar to that within the cylinder 37. The wall of the cylinder 38 is provided with a plurality of longitudinal passages 50 similar to the passages 43 in the cylinder 37. The spaces between the outer folds of the bellows are filled with liquid, the passages 50 permitting the liquid to pass from the spaces between the folds into the expansible chamber 45.

When pressure is applied to the piston 39 it will be forced upwardly against the pressure in the bellows. The liquid surrounding the outer folds of the bellows will be forced through the ports 42 into the expansible chamber 45. This will force the piston 49 upwardly against the pressure fluid contained within the bellows. The oil surrounding the outer folds of the bellows 47 will be forced into the expansible chamber 45.

The operation of the device as so far described should now be apparent.

Force applied to the draw bar 13 will tend to move either the piston 27 or the cylinder 26. If movement is to the right, as shown in Figs. 1 and 2, the yoke pressing against the plate 20 will force the piston 27 toward the right and force liquid through the perforations into the chamber in the right end of the cylinder and force this fluid through the pipe 34 into the pressure chamber 35. The ports 30 will restrict the flow of the fluid and as the conical projections 32 close the ports the flow of the fluid will be increasingly restricted. This will cushion the impact against the end of the draw bar 13. When the draw bar 13 is moved to the left the end 9 of the yoke 11 pushing against the plate 21 will move the cylinder 26 to the left against the piston to force the liquid out through the perforations in the same manner as when the piston is moved and the cylinder remains stationary. The slip joint 36 permits an axial movement of the pipe 34 with respect to the pressure chamber 35.

In the modified form shown in Fig. 6, the cylinder 51 is provided with a piston 52 having a plunger 53. The inside of the end of the cylinder 51 is tapered and has longitudinal grooves 54 therein. A port 55 connects with the pipe 34, the same as that shown in Fig. 1. When the piston enters the tapered chamber in the end of the cylinder the oil contained therein is forced out through the longitudinal channels 54 into the pipe 34 against the pressure in the chamber 35 (the same as in Figs. 1 and 3).

In the modified form shown in Fig. 7, the cylinder 56 has the partition wall 57 with the ports 58 therethrough. The end of the cylinder opposite the piston 27 contains a floating piston 59. The space between the floating piston 59 and the end 60 of the cylinder is filled with air or some other compressible fluid. Movement of the piston 27 will force liquid through the ports 58 to force the floating piston 59 against the air pressure in the end of the cylinder. In this form the air pressure more directly cushions the action of the oil which is forced against it.

In the form shown in Fig. 8, the cylinder 61 is similar in construction to that shown in Fig. 7 but the chamber at the right of the piston 62 is filled with air which cushions the movement of the floating piston 62 and has also a compression spring 63.

In all of the forms shown in Figs. 6, 7 and 8, it should be understood that either the piston may move against the cylinder or the cylinder may move against the piston. The cushioning effect of the fluid within the cylinders is the same in either case.

Fig. 5 shows a modified form of pressure chamber. In this form are provided two cylindrical tanks 64 and 65. A piston 66 is adapted to reciprocate in the cylinder 64 and a piston 67 in the cylinder 65. A piston rod 68 rigidly joins the pistons 66 and 67. A pipe 69 joins the space above the piston 66 with the space above the piston 67. The space above the piston 67 may also be in communication with a source of air under pressure through pipe 70, in which is a check valve 71. An air vent 72 subjects the lower side of the piston 67 to atmospheric pressure. Pressure of oil through the pipe 34 fills the space below the piston 66 and the pressure is resisted by the compressed fluid above the pistons 66 and 67. The pipe 52 equalizes pressure on the heads of the pistons 66 and 67.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention, and I, therefore, do not limit myself to what is shown in the drawings and described in the specification, but only as set forth in the appended claim.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

In a draft gear for trains, a stationary frame, a draw bar and yoke slidably mounted in said frame, a cylinder mounted within said yoke and slidable axially in the yoke, a piston in said cylinder, a piston rod extending out of one end of said cylinder and engageable by one end of the said yoke, the other end of the yoke being engageable with the other end of the cylinder, a body of liquid confined within the cylinder, a perforated partition in the cylinder for restricting the flow of liquid from one end of the cylinder to the other, a flexible container remotely positioned from the cylinder containing a body of compressible fluid, connections from said container to the said cylinder to subject the liquid therein to pressure, said pressure fluid serving to move the piston outward with respect to said cylinder after it has been moved in by movement of the piston or the cylinder by the said yoke, substantially as set forth.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 9th day of November, A. D. nineteen hundred and twenty-seven.

BYRAM S. DICKERSON.