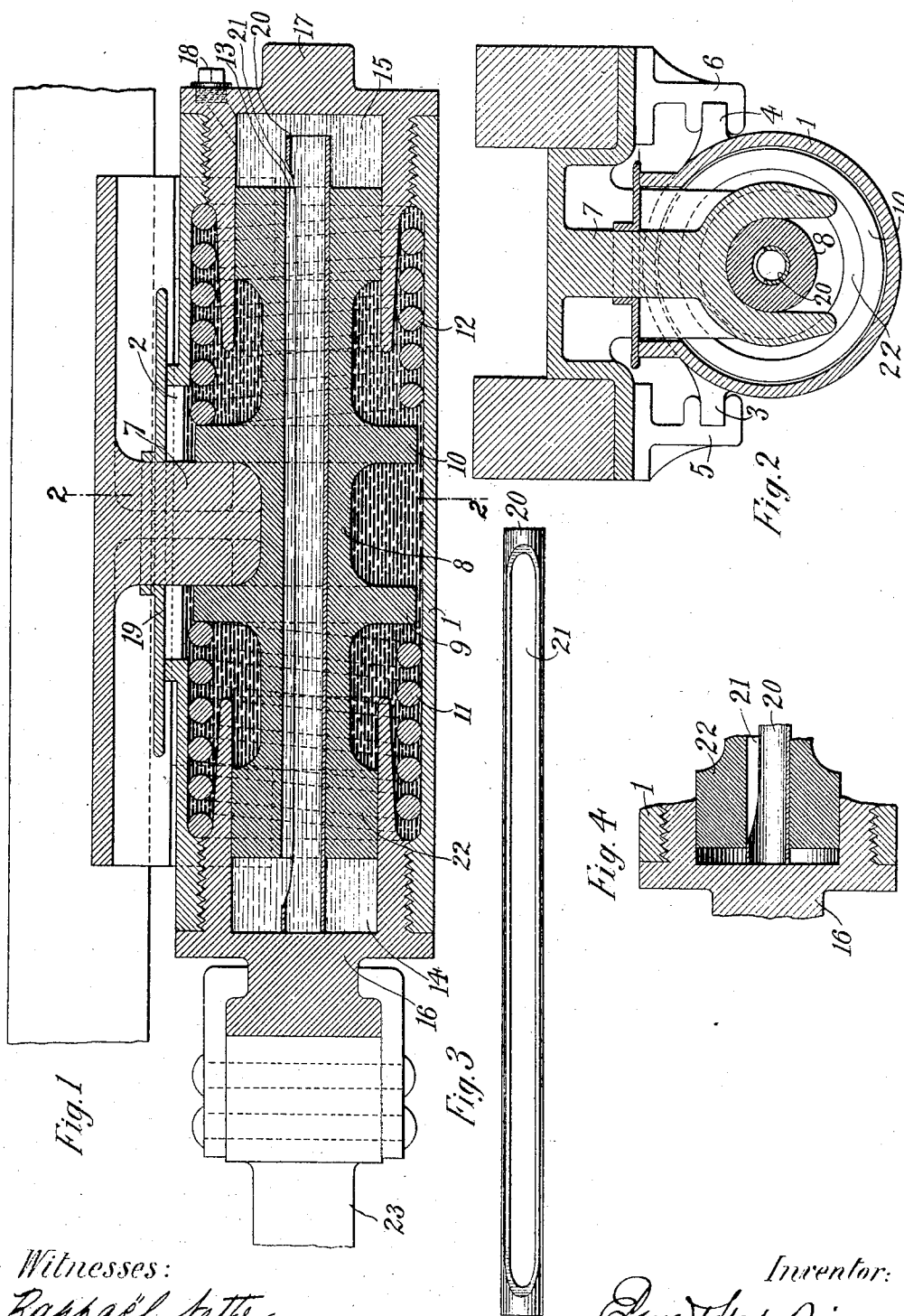


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E. HOPKINSON.
CUSHIONING DRAFT GEAR.
APPLICATION FILED OCT. 7, 1903.



Witnesses:

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CUSHIONING DRAFT-GEAR.

SPECIFICATION forming part of Letters Patent No. 782,964, dated February 21, 1905.

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To all whom it may concern:

Be it known that I, ERNEST HOPKINSON, a citizen of the United States, residing at No. 25 Washington Terrace, in the city of East Orange, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Cushioning Draft-Gear, of which the following is a specification.

My invention relates to cushioning draft-gear particularly adapted for use in connection with railroad-cars, and has particular reference to the mechanism whereby a compensation is effected in either direction of strain.

It has for its object to provide a construction in which the draft and buffing strains are taken up by a cushioning device and in such a construction to provide means whereby there shall be the greatest possible variation between the initial and final resistance in the cushioning movement.

According to my invention two operative members are employed, one movable and the other stationary. The movable member is constructed cylindrical in form and somewhat longer than the stationary member, thereby forming a chamber at each end of the stationary member. The movable member is designed to reciprocate upon the stationary member, which latter acts as a piston, the movable member carrying the coupling draw-bar. The stationary member is provided with a channel which connects the chambers at each of its ends, and in this channel there is located a device independent of both of said members, but operative by the movable member, which device acts alternately to provide an ample inlet to one chamber, while it acts as a throttling device for the liquid of the other chamber. The apparatus is preferably hermetically sealed by completely filling with liquid the chambers at each end of the stationary member and the channel communicating them.

I shall now describe the device as illustrated in the drawings embodying my invention and shall thereafter point out my invention in claims.

Figure 1 is a longitudinal central section of an apparatus embodying my invention. Fig.

2 is a vertical section of the same on the line 2 2 of Fig. 1. Fig. 3 is a top or plan view of the throttling device removed, and Fig. 4 is a broken sectional detail showing the relationship of the parts at extreme stroke.

The movable member 1 is shown as cylindrical in form, provided with a longitudinal opening 2 on its upper side and with longitudinal flanges 3 and 4 extending laterally. The flanges 3 and 4 are adapted to operate in guide-pieces 5 and 6 and support the cylinder throughout its reciprocal movement.

The stationary member 22 acts as a piston and is held in position in the movable member by an arm 7, that is rigidly attached to the sills of the car-body and which forms a rigid abutment whereby the buffing or draft strains are transmitted to the car-body. This abutment in the embodiment of my invention shown in the drawings is in form of a yoke or a forked arm and is adapted to embrace an attenuated portion 8 of the piston-stem between two annular flanges 9 and 10 located thereon. These flanges 9 and 10 are also utilized as an abutment for springs 11 and 12, located within the movable member and abutting against a portion thereof, and have the function of exerting a resilient pressure upon such flanges in opposition to the reciprocal movements of the movable member to bring the same to central or normal position. The stationary member is further provided with a longitudinal channel 13. The movable member is constructed somewhat longer than the stationary member, thereby forming chambers 14 and 15 therein beyond the ends of the stationary or piston member, and suitable heads 16 and 17 are provided, one of which carries the draw-bar 23 and the other a plug 18 closing an orifice (shown in dotted lines) to the interior of the movable member. These heads in the drawings are shown as screwed into the cylindrical movable member and as carrying the bearing-surface for the complete stroke of the piston, which has been found in practice to be a convenient construction. The movable member is also provided with a cover-cap 19, that is adapted to embrace the abutment-arm 7 and of a sufficient length to close the longitudinal opening 2 dur-

ing the complete reciprocal play of this member. The cap 19 may be made in any manner to permit of ready removal, as by being made in sections.

5 It is the purpose of this invention to utilize a liquid as an absorbent of the buffing and draft strains, and for this purpose the movable member is filled with a liquid behind the piston-faces by means of the opening 2, and the chambers 14 and 15, as well as the channel 13 connecting them, are preferably completely filled with a liquid through the orifice closed by the plug 18. To absorb or cushion the buffing or the draft strains to the greatest advantage, it is
10 necessary that the displacement of the liquid shall offer a minimum resistance at the commencement of the buffing or draft strain and that the resistance to displacement shall be progressively increased until it reaches its
20 maximum as the operative parts of the device approach their extreme position. For this purpose I have found in practice that a convenient form consists of the tube 20, which is provided with a longitudinal slot 21, gradually
25 tapered off at both ends, the tube being left open-ended, but preferably terminating with a complete tube-section at each end. The tube is located in the channel 13 so as, while it is freely movably therein, it has some frictional
30 engagement with the walls of the channel 13.

Referring to Fig. 1 and assuming that a draft strain is applied to the draw-bar 23, this will have the effect of operating the movable member so that the entire face of the head 17
35 moves toward the open end of the tube 20, expelling the liquid from the compartment 15, which liquid finds an easy and ample exit from the compartment through the open end of the tube, as well as through the end of the slot 21.
40 As the device moves in this direction the entire face of the head 17 finally impinges on the end of the tube 20, closing the open end and causing the remainder of the liquid to pass through the graduated end of the slot 21.
45 The further movement of the cylinder in the same direction carries the tube along with it, thus gradually diminishing the area of the exit from the compartment 15 and correspondingly increasing the resistance to movement. It will be observed that the displaced
50 liquid flows through the tube 20 and finds an ample and easy inlet into the opposite compartment 14 through the end of the tube which is now open, as well as through the slot
55 21. By this means the initial impact meets comparatively little resistance, but the movement of the cylinder 1 is increasingly opposed by the increased resistance of the liquid due to the progressively-diminished exit-orifice
60 controlled by the movement of the movable member.

What is claimed as new is—

1. An apparatus of the character described, comprising a member having at each end a liquid-filled cushioning-compartment, and a displacement member between said compartments, said displacement member being perforated and carrying suitable throttling means; said throttling means and said displacement member being relatively movable, and said
70 throttling means being constructed and operating to throttle the relative movement in either direction of said compartment member and said displacement member.

2. An apparatus of the character described, comprising a member having at each end a liquid-containing compartment, a displacement member, and means for throttling the relative movement in either direction of said members; said throttling means extending through said displacement member and being movable therewithin, and in communication with both of said liquid-containing compartments.

3. An apparatus of the character described, comprising a member having at each end a liquid-containing compartment, a perforated liquid-displacing member between said compartments, and means for throttling the relative movement in either direction of said members; said throttling means comprising an independently-movable member.

4. An apparatus of the character described, comprising a member containing at its ends liquid-filled cushioning-compartment, a piston member between said compartments and having a passage connecting said compartments, means extending through said piston for throttling the relative movement in either direction of piston and compartment member, and means connected to said piston between its ends for controlling the same.

5. An apparatus of the character described, comprising a member containing at its ends liquid-filled compartments, a piston member working between said compartments and provided with a passage connecting said compartments, means connected to said piston between its ends for controlling the same, and means movable relatively to said piston and to said compartment member, for throttling said passage, to cushion the relative movement of the piston and compartment member in either direction.

6. An apparatus of the character described, comprising a member containing liquid-filled compartments, a piston member working between said compartments and provided with a passage connecting said compartments, and a single member extending through the piston and provided at its ends with means for throttling the movements of liquid from the compartments through the piston member.

7. An apparatus of the character described, comprising a member having at each end a liquid-containing compartment, a piston member between said compartments and having a head at each end, said piston having a perforation through which the liquid may pass between said compartments, a tubular throttling device within the piston member; and means controlling the relative movement of the piston member and the compartments.

nected to said piston member between its ends for controlling the same.

8. An apparatus of the character described, comprising a member having a liquid-containing compartment, a piston member having a perforation through which the liquid may pass from said compartment, and a throttling device of tubular form within the perforation and also extending into said compartment, and having a plurality of orifices; the construction and arrangement being such that by relative movement of said compartment member and said piston one of said orifices may be closed.

9. An apparatus of the character described, comprising a member having a liquid-containing compartment, a piston member having a perforation through which the liquid may pass from said compartment, and a throttling device comprising an open-ended tube within the perforation; said tube extending into said compartment, and conducting the liquid from the compartment into the piston and being movable relative to the piston and to the compartment member, and being closed at its end by an initial relative movement of the piston and the compartment member, and also having in its side an orifice which is gradually closed during continued relative movement of the piston and compartment member.

10. An apparatus of the character described, comprising a member containing liquid-filled compartments, a piston member having a passage connecting said compartments, and a tube extending through said passage and having means for throttling only the outward flow of liquid from each compartment.

11. An apparatus of the character described, comprising a member containing liquid-holding compartments, a piston member having a passage connecting said compartments, and throttling means tubular in form at the opposite ends of the piston member and extending into the compartments; said tubular throttling means serving to conduct the liquid from the compartments into the piston.

12. An apparatus of the character described, comprising a member containing liquid-holding compartments, a piston member having a perforation connecting said compartments,

and a throttling member extending through the perforation in the piston member and into said compartments.

13. An apparatus of the character described comprising a stationary member and a liquid-containing member having cushioning-chambers therein and an independently-movable member carried by the stationary member and penetrating the cushioning-chambers and throttling the flow of the liquid therefrom.

14. An apparatus of the character described comprising a stationary member and a movable member provided with liquid-containing chambers in communication through the stationary member and a throttling device within such communicating passage and penetrating into the liquid-chambers and having a restricted opening in each chamber.

15. An apparatus of the character described comprising a stationary member and a movable member provided with liquid-containing chambers on either side of the stationary member and in communication with each other through a passage in the stationary member and a tubular movable member provided with a longitudinal slot that penetrates into the liquid-chambers and restricts the flow of the liquid therefrom.

16. An apparatus of the character described comprising a stationary member located within a movable member and operating to displace a liquid therein from one side to the other thereof and a throttling means within the stationary member operated by the movable member to restrict the displacement of the liquid.

17. An apparatus of the character described comprising a stationary double-headed piston within a liquid-containing cylinder carrying the draft means, a passage through the piston provided with a sliding tube having a longitudinal slot therein and adapted to throttle the piston-passage.

In witness whereof I have hereunto set my hand this 6th day of October, 1903.

ERNEST HOPKINSON.

Witnesses:

THOMAS J. SURPLESS,
H. RICHARD WOBSE.