No. 649,189. Patented May 8, 1900.

H. H. WESTINGHOUSE & F. MOORE.

DRAW GEAR AND BUFFING APPARATUS.

(Application filed Feb. 1, 1900.)

(No Model.) 2 Sheets—Sheet 1.

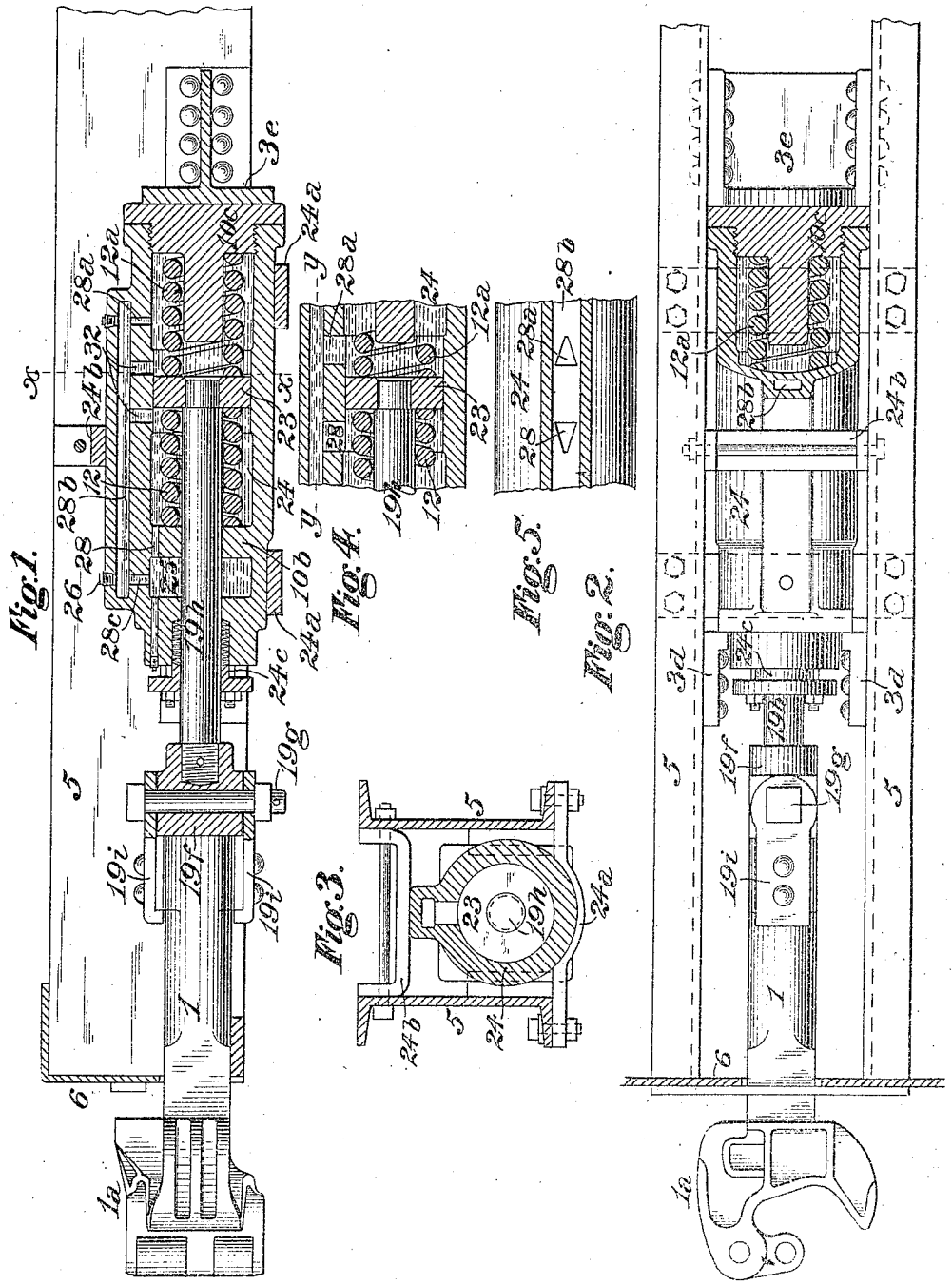

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 2.

Fig. 3.

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Fig. 6.

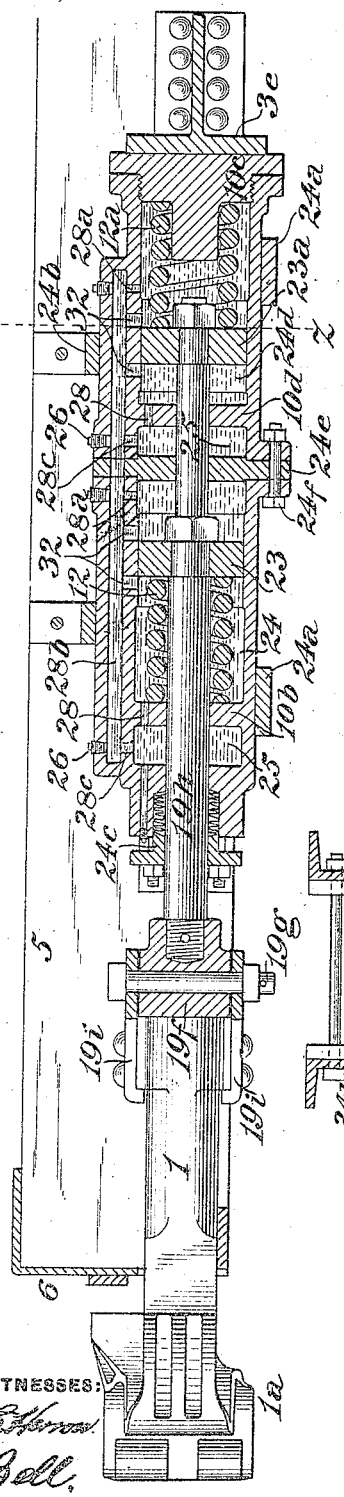


Fig. 8.

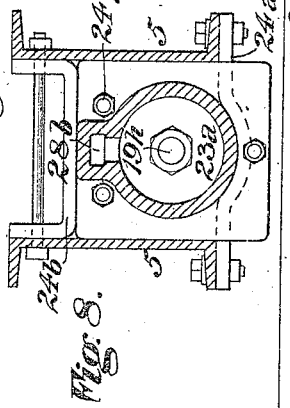
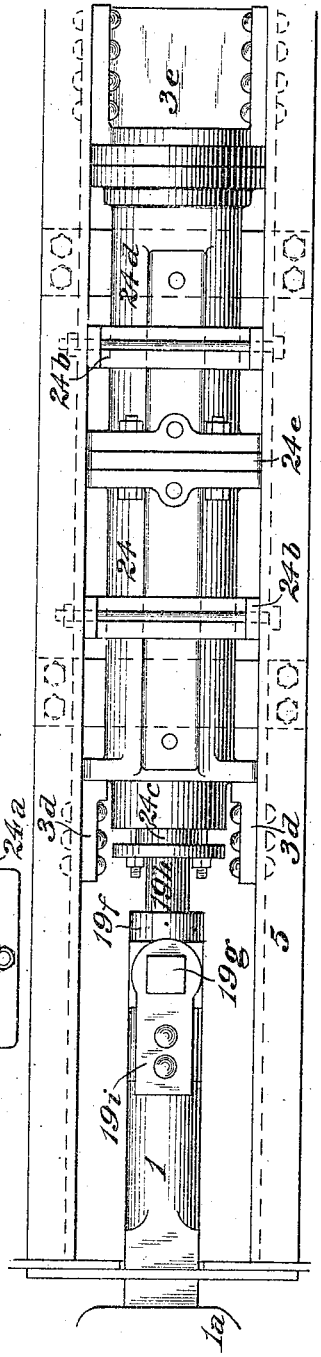


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY HERMAN WESTINGHOUSE AND FRANK MOORE, OF PITTSBURG, PENNSYLVANIA.

DRAW-GEAR AND BUFFING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,189, dated May 8, 1900.

Original application filed March 31, 1899, Serial No. 711,268. Divided and this application filed February 1, 1900. Serial No. 3,586. (No model.)

To all whom it may concern:

Be it known that we, HENRY HERMAN WESTINGHOUSE and FRANK MOORE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Draw-Gear and Buffing Apparatus, of which improvement the following is a specification.

Our invention relates to devices for resisting and counteracting the shocks and strains of draft and buffing which are encountered in railroad service of the class or type and embodying the essential operative principle of that which is set forth in an application for Letters Patent filed by George Westinghouse under date of January 23, 1899, Serial No. 703,201.

The object of our invention is to provide an apparatus of such general class in which the secondary resistance element shall be adapted to afford any desired degree of secondary or final resistance and be readily adaptable to service on cars of standard construction.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal central section through a draft and buffing apparatus, illustrating an embodiment of our invention; Fig. 2, a plan or top view, partly in section, of the same; Fig. 3, a transverse section at the line $x\,x$ of Fig. 1; Fig. 4, a partial longitudinal section illustrating a different form of release-port; Fig. 5, a horizontal section at the line $y\,y$ of Fig. 4; Fig. 6, a vertical longitudinal section illustrating a structurally-modified form; Fig. 7, a plan or top view of the same, and Fig. 8 a transverse section at the line $z\,z$ of Fig. 6.

In the practice of our invention we provide, as in our application, Serial No. 711,268, filed March 31, 1899, of which this application is a division, a preliminary spring resistance element, a secondary hydrostatic-pressure resistance element, and means for independently and successively exerting strain upon said preliminary and secondary resistance elements. Our present invention while embodying these governing and characteristic features differs structurally from that set forth in our application Serial No. 711,268 in that a lever intermediate between the draw-bar and the hydraulic-pressure device is dispensed with and the cylinder and piston of the latter are disposed in line axially with the draw-bar instead of at right angles thereto, as in the instances before described. To this end a pressure-cylinder 24 is located between the center sills in or substantially in line axially with a draw-bar 1 and is supported and held as against vertical movement between lower transverse bars 24^a, secured to the lower flanges of the center sills 5, and an upper bar or bars 24^b, secured to the upper flanges thereof. The piston 23 is fitted to traverse in the middle portion of the cylinder 24, which is bored out truly to receive it, and is secured upon a piston-rod 19^h, the outer end of which is connected to the inner end of the draw-bar. In the instance shown the piston-rod 19^h is secured to a block 19^f, which is in turn secured by a bolt 19^g and straps 19^i to the draw-bar 1. Any other suitable and preferred means of connection may, however, be adopted. The pressure-cylinder 24 is closed at its inner or rear end by a substantial head 10^c, which abuts against a back draw-bar stop 3^e, which is rigidly secured to the center sills 5, and at or near its front end the cylinder abuts against the front draw-bar stops 3^d, which are also rigidly secured to the center sills. The preliminary resistance element of this construction is, when the apparatus is subjected to strains of draft, a draft-spring 12, which is interposed between, and bears against, the outer side of the piston 23, and an abutment 10^b, which is formed upon the pressure-cylinder 24 and constitutes a partition between the space therein which contains liquid intended to be subjected to pressure and the lower portion of a liquid-reservoir composed of a space 25 in the forward portion of the cylinder, and a longitudinal passage 28^b, leading from the cylinder-space 25 to the cylinder-space on the rear side of the piston 23 and connected with the cylinder by ports 28^c,

32, and 28^a. Liquid is transferred from the space containing the piston to the liquid-reservoir 25 28^b when the piston is moved in either direction. Under buffing strains the preliminary resistance element is a buffing-spring 12^a, which is interposed between and bears against the inner or rear side of the piston 23 and the back head 10^c of the cylinder. A release-port 28 of small capacity leads from the cylinder-space in front of the piston to the lower portion 25 of the liquid-reservoir, and a similar release-port 28^a leads from the cylinder-space in rear of the piston to the upper portion of the liquid-reservoir—to wit, the longitudinal passage 28^b. This passage communicates by a port 28^c with the lower portion 25 of the liquid-reservoir and also communicates with the cylinder 24 by two initial release-ports 32, located on opposite sides of the mean or normal position of the piston 24, each being of sufficient capacity to admit of the free discharge of liquid without imposing resistance to the movement of the piston. Liquid may be supplied to the cylinder and reservoir through a passage closed by a screw-plug 26, and leakage of liquid is prevented by a properly-packed stuffing-box 24^c in the front head of the cylinder, through which the piston-rod 19^b passes. The liquid in the lower portion 25 of the reservoir not being subjected to pressure, the provision of a properly-packed stuffing-box 24^c admits of the free traverse of the piston-rod 19^b in either direction without leakage of liquid, which in the operation of the appliance passes from the cylinder into and out of the reservoir in accordance with the movements of the piston and is not therefore depleted by escaping to the atmosphere.

In operation the pressure-cylinder 24 and reservoir 25 28^b having been supplied, but not completely filled, with liquid, as indicated by the liquid-level shown in Fig. 1, preliminary strains of draft applied to the draw-bar 1 are taken up by the draft-spring 12, if within the capacity thereof. If the draft strain is greater than can be resisted by the tension of the spring 12, the continued outward movement of the draw-bar and directly-connected piston 23 exerts pressure upon the liquid in the cylinder 24 in front of said piston against the resistance of the liquid in being compelled to pass through the small release-passage 28. The secondary resistance thereby instituted takes up draft strains in excess of the preliminary resistance capacity of the spring 12. In the movements of the draw-bar and piston under draft strains which are within the capacity of said spring the secondary resistance element is inactive, as the liquid which is moved forward by the piston passes freely into the reservoir through the left-hand initial release-port 32. This liquid returns by gravity to the cylinder when the strain on the draw-bar is released.

The operation under buffing strains is similar in all particulars to that above described, preliminary strains being taken up by the buffing-spring 12^a and strains greater in degree by the secondary resistance instituted by forcing liquid from the cylinder-space in rear of the piston through the release-port 28^a.

Under certain conditions of service it may be desirable that a secondary resistance progressively increasing in degree should be afforded, and means for attaining this end are shown in Figs. 4 and 5. The initial release-ports 32 are in this case omitted, and the release-ports 28 and 28^a are located at such distance from the mean or normal vertical central plane of the piston 23 that they may respectively be wholly or partially covered and closed by said piston in its movements in either direction, and each is made of differential transverse areas throughout its length, these decreasing progressively in each port as by inwardly tapering or inclining the same in the direction of the traverse of the draw-bar and piston under strains of draft and buffing, as the case may be. There thus being a progressively-decreasing avenue of escape for liquid in proportion to the increased degree of traverse of the piston under strains greater than those within the capacity of resistance of the draft or the buffing spring, as the case may be, it will be seen that a correspondingly-increasing secondary resistance will be instituted, the degree and rate of which may be adjusted as desired by suitable proportions of the differential or tapered release-ports.

The construction shown in Figs. 6 to 8, inclusive, accords with that of Figs. 1 to 3, inclusive, in all its characteristic features of construction and operation and, further, enables a substantially-increased secondary resistance to be exerted. As in the construction of Figs. 1 to 3, inclusive, a pressure-cylinder 24 is located between the center sills 5 substantially in line axially with the draw-bar, and its piston 23 is positively connected to the draw-bar. The piston-rod 19^b is prolonged and extends into a second pressure-cylinder 24^d and is provided with a piston 23^a, which is fitted to traverse therein. The cylinder 24^d is supported similarly to the cylinder 24 in line axially therewith and is separated therefrom by an interposed head or partition 24^e, the cylinders and head 24^e being connected together by bolts 25^c. The rear end of the inner or second cylinder 24^d is closed by a stout head 10^e, which abuts against the back draw-bar stop 3^a, and the cylinder 24^d abuts near its front end against the front draw-bar stops 3^a. The draft-spring 12 is interposed between the outer side of the piston 23 and an abutment 10^b in the cylinder 24, and the buffing-spring 12^a is interposed between the rear side of the piston 23^a and the back head 10^c. Any desired number of cylinders and pistons, disposed similarly to those shown, may be employed. A liquid-reservoir, composed of a space 25 in each cylinder and a longitudinal connecting-passage 28^b, is

provided, and each cylinder has release-ports 28 28^a of small capacity leading from opposite sides of its piston into the reservoir-spaces 25 and into the passage 28^b, respectively. The reservoir-spaces 25 are connected with the longitudinal passage 28^b by ports 28^c, and initial release-ports 32 of sufficient capacity to afford free passage for liquid lead from each of the cylinders on opposite sides of and adjacent to the mean position of the piston into the reservoir-passage 28^b.

In operation preliminary strains of draft or buffing or those within the capacity of resistance of the springs 12 and 12^a are taken up by said springs, respectively, as in the construction of Figs. 1 to 3, inclusive, and strains which are in excess of the capacity of the springs are counteracted by the secondary resistance instituted by forcing liquid by the movements of the two connected pistons 23 and 23^a from the cylinder-spaces in front or in rear of said pistons, as the case may be, through the appropriate release-ports 28 28 or 28^a 28^a. It will be obvious that the degree of secondary resistance will be increased proportionately to the number of pressure-cylinders which are employed, in the discretion of the constructor.

In the instances above described, in which the hydraulic-pressure actuating mechanism is positively connected to the draw-bar, the draft and buffing springs have, to attain economy of space and for convenience and clearness of explanation, been illustrated as placed within the pressure-cylinders. It will, however, be apparent to those skilled in the art that such specific location of the springs is not of the essence of our invention and that they may without departure therefrom be applied exterior to the pressure-cylinders, if preferred.

We claim as our invention and desire to secure by Letters Patent—

1. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary resistance-spring which is acted on by movements of the draw-bar, a fluid-pressure cylinder supported substantially in line axially with the draw-bar, a piston fitting therein, a piston-rod connected to the draw-bar and carrying said piston, a liquid-reservoir, and a release-port connecting said liquid-reservoir with the cylinder.

2. In a draw-gear or buffing apparatus, the combination of a draw-bar, a fluid-pressure cylinder supported substantially in line axially therewith, a piston fitting said cylinder, a piston-rod connected to the draw-bar and carrying said piston, front and back draw-bar stops abutting against the cylinder, a liquid-reservoir, a release-port connecting said liquid-reservoir with the cylinder, and draft and buffing springs, subject, respectively, to compressive strain by the movement of the draw-bar in one or the other direction.

3. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary resistance-spring which is acted on by movements of the draw-bar, a fluid-pressure cylinder, a piston fitting therein, means for actuating said piston by movements of the draw-bar, a liquid-reservoir, and a differential or varying transverse area release-port, adapted to be traversed by the piston and connecting the liquid-reservoir and fluid-pressure cylinder.

4. In a draw-gear or buffing apparatus, the combination of a draw-bar, a plurality of fluid-pressure cylinders supported substantially in line axially therewith, pistons, each fitting one of said cylinders, a piston-rod connected to the draw-bar and carrying said pistons, front and rear draw-bar stops, abutting, respectively, against the end cylinders of the series, a liquid-reservoir, release-ports connecting the cylinders with the reservoir, and draft and buffer springs, subject, respectively, to compressive strain by the movement of the draw-bar in one or the other direction.

5. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary resistance-spring which is acted on by movements of the draw-bar, a fluid-pressure cylinder supported substantially in line axially with the draw-bar, a piston fitting therein, a piston-rod connected to the draw-bar and carrying said piston, a liquid-reservoir surrounding the piston-rod at the outer end of the cylinder, a release-port connecting said liquid-reservoir with the cylinder, and means for packing the joint between the piston-rod and reservoir.

6. In a buffer for railway-cars, the combination of the draw-bar, the relatively-movable double cylinder and the two plungers, and the restricted passage between the cylinders.

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