No. 649,188. Patented May 8, 1900.

H. H. WESTINGHOUSE & F. MOORE.

DRAW GEAR AND BUFFING APPARATUS.

(Application filed Mar. 31, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

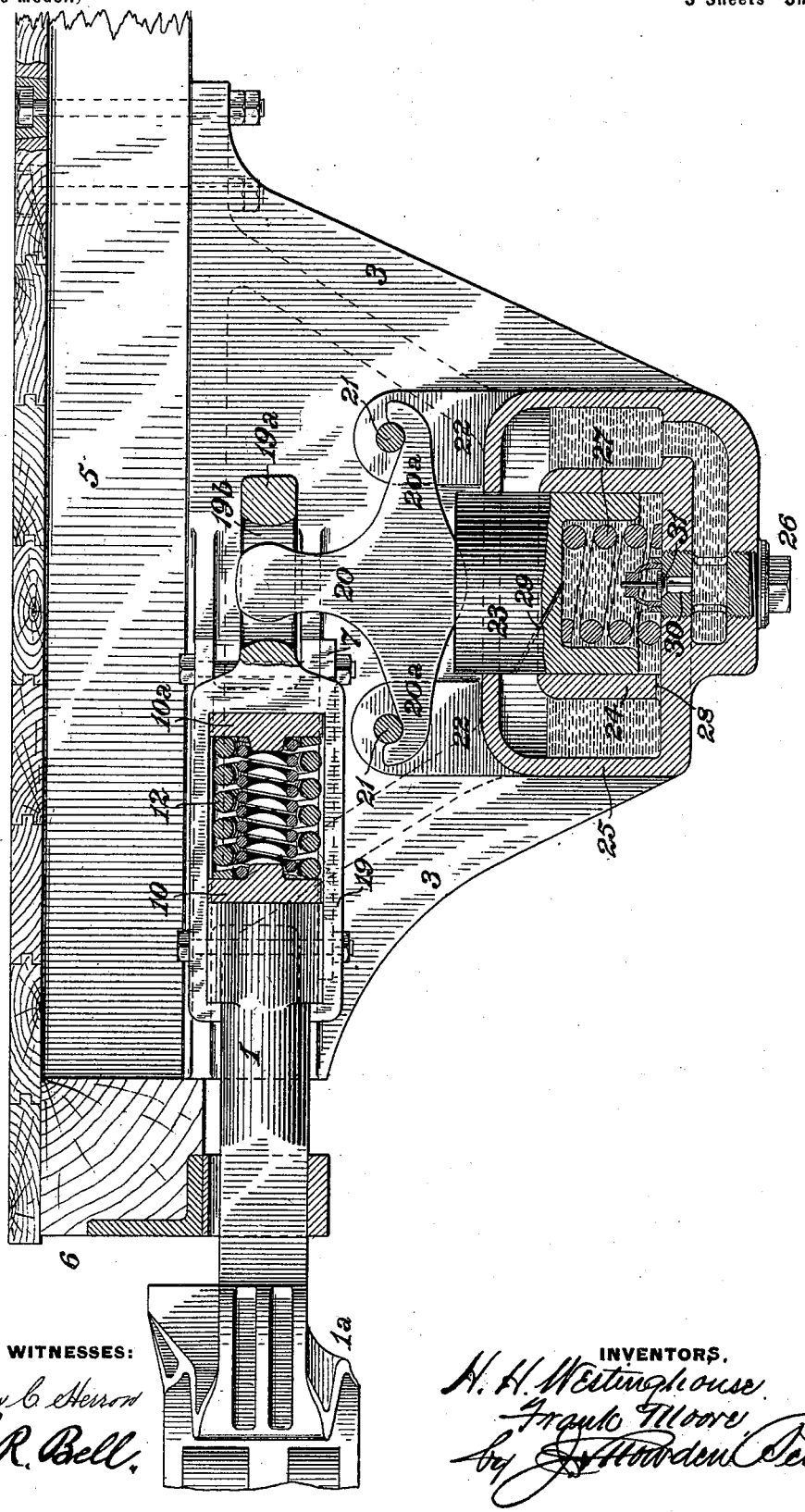

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Fig. 3.

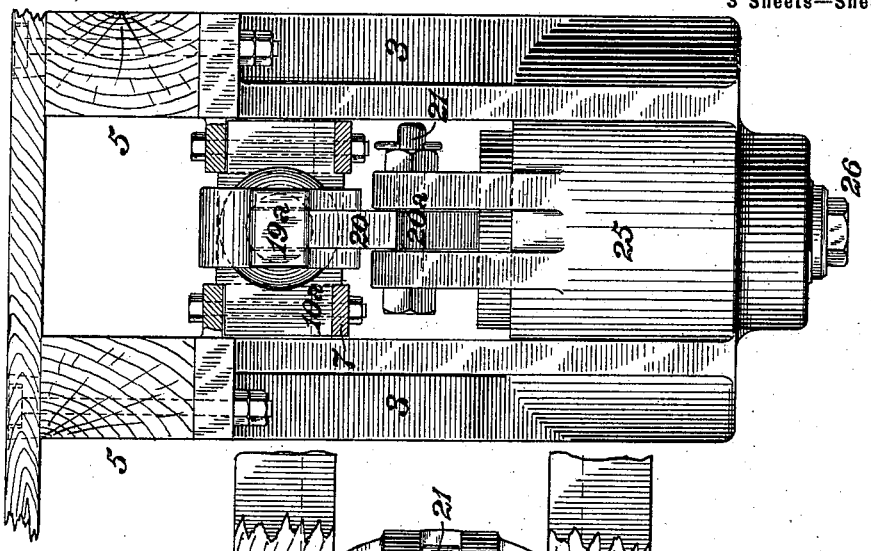

Fig. 2.

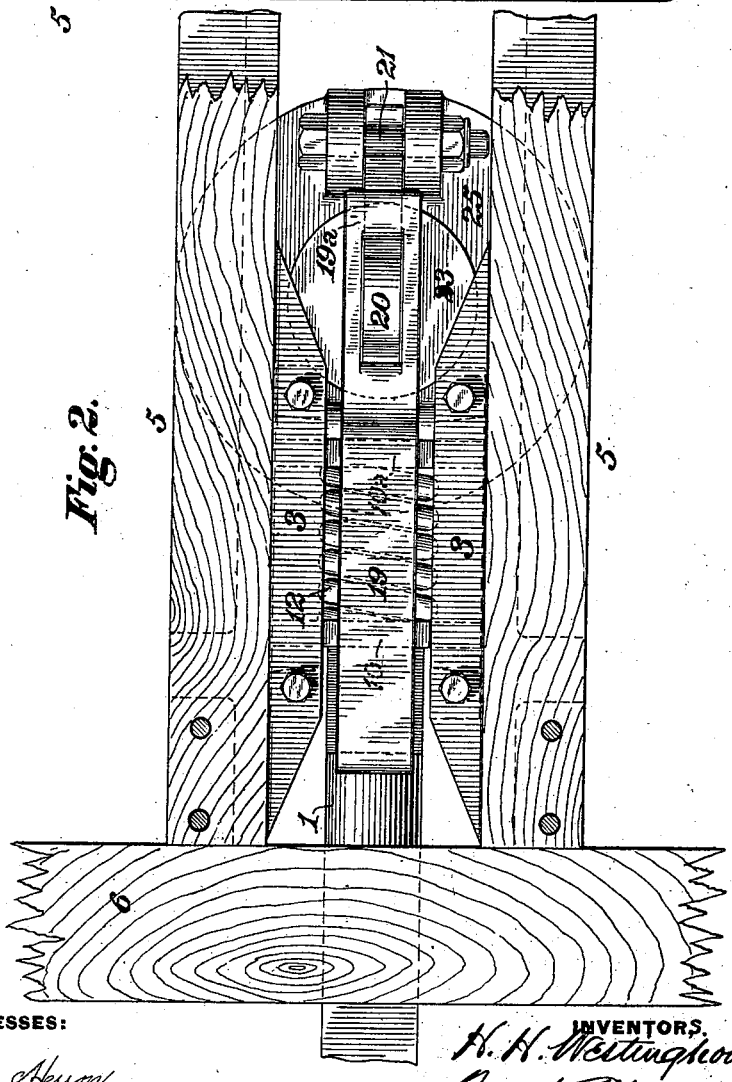

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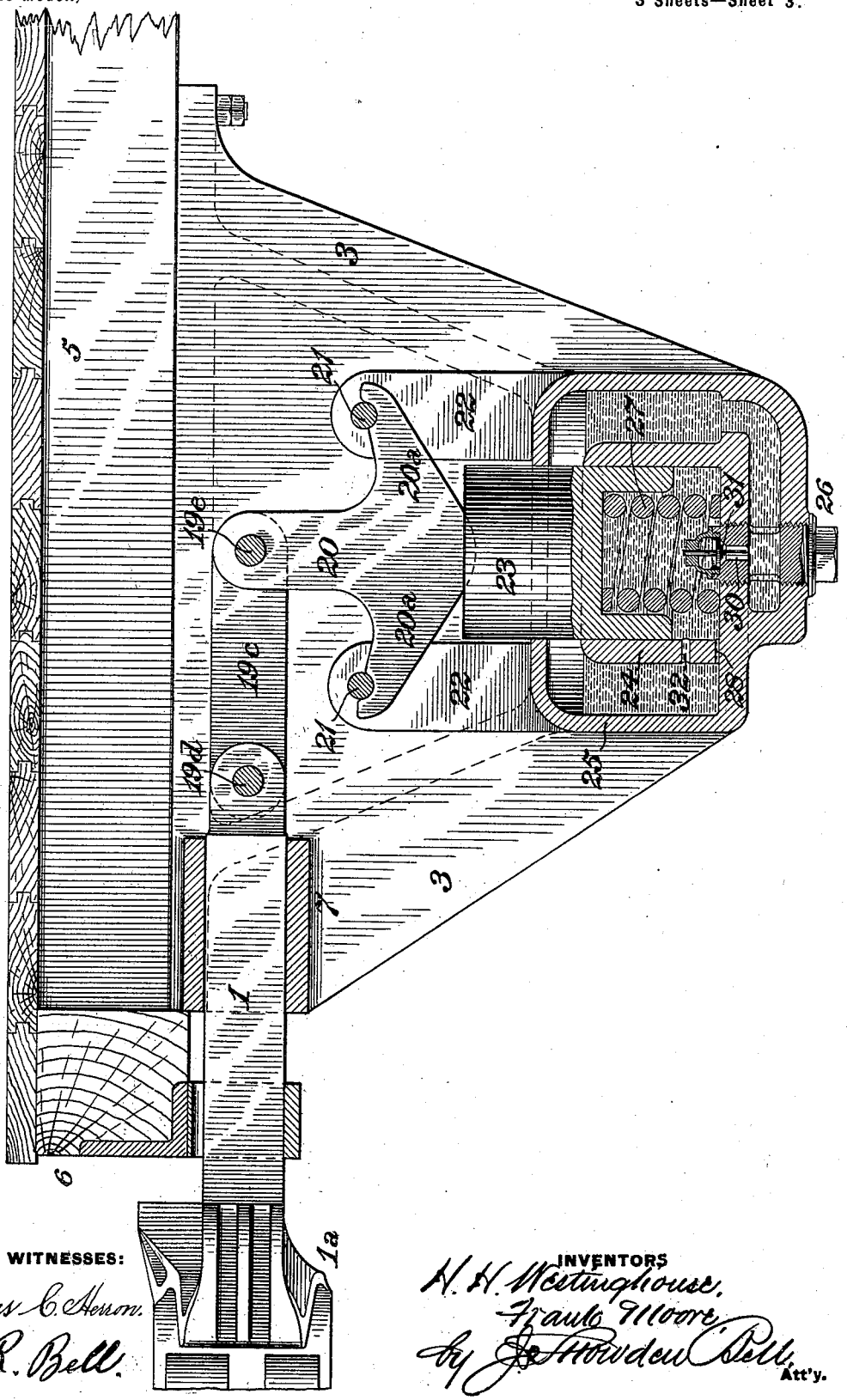
Fig. 4.



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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. 649,188, dated May 8, 1900.

Application filed March 31, 1899. Serial No. 711,268. (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.

To this end our invention, generally stated, consists in the combination of a preliminary spring resistance element, a secondary hydraulic-pressure resistance element, and means for independently and successively exerting strain upon said preliminary and secondary resistance elements.

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 of the same; Fig. 3, an end view as seen from the left with the supporting and guide bars of the follower-plates in section, and Fig. 4 a vertical longitudinal central section illustrating a structurally-modified form of our invention.

In the specific form of our invention which is illustrated in Figs. 1 to 3, inclusive, a draw-bar 1, provided with a suitable coupling-head 1^a, is fitted to move longitudinally within a short range of traverse between the center sills 5 of the frame of a railroad-car, at each end thereof, or, if preferred, between draft-timbers or draw-gear supports of any suitable and approved construction, the outer end of the draw-bar and the connected coupling-head 1^a projecting beyond the end sill 6 in the ordinary manner.

Tractive force and strains of draft applied to the draw-bar 1 are transmitted therefrom to the car-frame through a resistance mechanism, to be presently described, which is supported by vertical frame-plates 3, of cast or wrought iron, secured to the lower sides of the center sills 5. A U-shaped draft-strap 19 is secured to the inner end of the draw-bar, and a front and a back follower-plate 10 and 10^a, respectively, are fitted freely in the draft-strap against the inner end of the draw-bar and the rear end of the draft-strap, respectively, so that either of said plates may be moved longitudinally therewith or may remain stationary during the movement thereof, as occasion may require. The follower-plates traverse on and together with the draft-strap and inner end of the draw-bar are supported by removable rails or bars 7, secured to the frame-plates 3. Inwardly-projecting flanges are formed upon the frame-plates near their upper ends to serve as guides for the tops of the follower-plates. Strains of draft are imparted to the car-frame by the front follower-plate 10 through front draw-bar stops formed upon or fixed to the frame-plates 3, and buffing strains are taken by the car-frame through similar back draw-bar stops, against which the back follower-plate 10^a normally abuts.

Preliminary strains and those which are of comparatively minor force and extent are opposed and counteracted both in draft and buffing by a preliminary resistance element, against which such strains and all other strains to which the apparatus is subjected initially act. The essential characteristics of the preliminary resistance element are that its capacity of resistance shall be equal to the maximum determined strain, which in and of itself it is designed in operation to oppose, and that it shall be elastic to such degree that its reactionary capacity shall be substantially equal to the maximum strain which it is designed to oppose. It consists, therefore, of a spring or concurrently-acting plurality of springs, which may be either in the form

of properly-disposed elastic bodies of metal or inclosed volumes of elastic fluid adapted in either case to be subjected to compression by the movements of the draw-bar under applied strains. In the instance shown the preliminary resistance element 12 is applied in the form of two helical springs coiled inside the draft-strap 19 one within the other and abutting at their ends against the front and back follower-plates 10 and 10^a, said springs having a slight initial tension sufficient to hold the follower-plates in position against the draw-bar and the draft-strap, respectively. The springs 12 are compressed either by the back or the front follower-plate, accordingly as the strain applied to the draw-bar is of draft or buffing and resist said strain to their maximum capacity, transmitting its resultant to the opposite follower-plate and the draw-bar stops against which it abuts.

Strains of draft and buffing which are in excess of the capacity of the preliminary resistance element are opposed and counteracted by a secondary or final resistance element which is independent of the preliminary resistance element and inactive during the exertion of the function thereof and which acts subsequently and supplementally to the preliminary resistance element. The essential characteristics of the secondary resistance element are, as in the application of George Westinghouse aforesaid, that it shall be wholly free from dependence upon the preliminary resistance element and that its capacity of resistance when superadded to that of the preliminary resistance element shall be equal to the maximum strain which the draft and buffing apparatus as a whole is designed in operation to oppose. The specific form of hydraulic-pressure mechanism employed is not in and of itself of the essence of our invention and may be materially varied in the discretion of the constructor without departure therefrom. The secondary resistance element which characterizes our present invention is in the form of a hydraulic-pressure device which is adapted to be actuated by the further traverse of the draw-bar 1 in either direction after the maximum resistance of the springs 12 has been exerted in opposition to draft or buffing strain. To this end a liquid-reservoir 25 for the reception of oil, water, or other incompressible liquid which is supplied through an opening closed by a removable plug 26 is formed on or secured to the vertical frame-plates 3 below and in rear of the draft-strap 19, said reservoir inclosing an open-topped pressure-cylinder 24, with the bottom of which it communicates by a passage 30, controlled by an upwardly-opening check-valve 31. A release-port 28 of small diameter leads from the lower end of the pressure-cylinder to the liquid-reservoir, and a similar release-port 29 may also be provided in the upper portion of the reservoir to admit of the escape of any air which may be trapped within the cylinder. The pressure-cylinder is fitted with a piston or plunger 23, which passes through an opening in the top of the liquid-reservoir and rests upon a releasing-spring 27, by which it is brought to and supported in normal position. An actuating-lever 20, having the form of an inverted T, abuts at the bottom of its vertical central arm on the top of the piston 23, and its horizontal arms 20^a bear near their ends on pivot-pins 21, fixed in standards 22, projecting above the top of the liquid-reservoir 25. The upper end of the central arm of the actuating-lever 20 normally stands centrally in a longitudinal slot 19^b, formed in an extension 19^a, projecting from the inner or rear end of the draft-strap 19. The length of the slot 19^b is sufficiently greater than the width of the upper end of the lever 20 to admit of the outward and inward movements of the draw-bar, which are effected under all draft and buffing strains in preliminary service without bringing the extension of the draft-strap into contact with the lever.

In the operation of a draw-gear and buffing apparatus embodying the essential and characteristic features of our invention, as in the instance hereinabove described, upon the application of draft strain to the draw-bar 1 outward movement is imparted to the connected draft-strap 19 and through the latter to the back follower-plate 10^a, thereby compressing the springs 12 to such degree as will counteract and take up the applied draft strain if within the limit of capacity of the springs 12 and bringing the front follower-plate 10 to a bearing against the front draw-bar stops. If the draft strain is greater than can be resisted by the tension of the springs 12, the continued outward movement of the draw-bar will bring the rear end of the slot 19^b in the extension of the draft-strap into contact with the actuating-lever 20 and rock said lever upon the inner pivot-pin 21 or that which is farthest from the draw-bar, thereby depressing the piston 23 and exerting pressure upon the liquid in the cylinder 24 against the resistance of said liquid in being compelled to pass out of the cylinder into the reservoir 25 through the small release passage or passages 28 or 28 and 29, as the case may be. The resistance of the liquid will be proportionate to the strain exerted on the actuating-lever 20 and piston 23 by the movement of the draw-bar and the sectional area of the release passage or passages, and upon the release or cessation of draft strain the releasing-spring 27 will return the piston 23 and lever 20 to their normal positions and liquid from the reservoir will raise the check-valve 31 and enter the cylinder 24 coincidently with the upward movement of the piston. The springs 12 will at the same time return the draw-bar and its accessories to the normal positions shown in Figs. 1 and 2.

The operation of the mechanism when the draw-bar is subjected to buffing strain and when released therefrom is the same in all particulars as that above described, except

that the strain is applied to the springs 12 by the movement of the front follower-plate 10 and is taken upon the frame through the back draw-bar stops. It will also be obvious that the back follower-plate 10^a will not be moved from its bearing against the back draw-bar stops and that the longitudinal traverse of the draw-bar and its accessories will be outward when under draft strain and inward when under buffing strain. Further, the outer pivot-pin 21 acts as the fulcrum of the actuating-lever 20. In each case, however, resistance to strain is presented, preliminarily, by the preliminary resistance element, and resistance to strain beyond the capacity of the preliminary resistance element is exerted by the secondary resistance element—*i. e.*, the hydraulic-pressure device above described—the same being, as will be seen, wholly independent of the preliminary resistance element, being without reactionary capacity and being inactive during the periods in which resistance to strain is exerted by the preliminary resistance element.

The construction shown in Fig. 4 differs, structurally, from that above described in that the springs 12 are dispensed with and the spring 27 is adapted to perform the function of a preliminary resistance element as well as that of a releasing-spring for returning the parts to their normal positions. The inner end of the draw-bar 1 is coupled by a pin 19^d to a link or pair of links 19^c, which is or are coupled by a pin 19^e to the central arm of the actuating-lever 20, so that movement of the draw-bar in either direction imparts coincident and corresponding movement to the actuating-lever. The spring 27 is made of proper strength to serve as the preliminary resistance element of the apparatus, and an initial release-port 32 of sufficient capacity to admit of the free discharge of liquid from the pressure-cylinder 24 without imposing resistance to the downward movement of the piston 23 is formed in the wall of said cylinder. The port 23 is located at such distance from the top of the cylinder 24 as to be covered and closed by the piston at or about the period of its downward traverse, in which it has under the action of the strain imparted to it by the draw-bar compressed the spring 27 a sufficient amount for preliminary service. The hydraulic-pressure device in other particulars corresponds with that first described.

In operation strain, either of draft or buffing, which is imparted to the draw-bar 1 is transmitted therefrom to the connected actuating-lever 20 and piston 23 and forces the piston downwardly against the resistance of the spring 27 until it is taken up and counteracted by said spring if it be within the limit of capacity thereof, said spring consequently performing the function of the springs 12 of the construction first described. During such traverse of the piston fluid will escape freely from the cylinder 24 through the initial release-port 32, and no hydraulic-pressure resistance will be exerted upon the piston. If the strain upon the draw-bar is greater than that which can be resisted by the tension of the spring 27 in its first or preliminary motion, the continued movement of the draw-bar and piston will close the initial release-port 32 and will thereupon exert pressure upon the liquid in the cylinder 24, the resistance of which will, as in the instance first described, constitute a secondary resistance, by which that of the spring 27 will be supplemented and the full and final strain will be taken up. Upon the release or cessation of strain upon the draw-bar the spring 27 will return all the parts to their normal positions, and liquid from the reservoir will raise the check-valve and reënter the cylinder in accordance with the upward movement of the piston. The conditions and sequence of action of the preliminary and secondary resistance elements are, as will be readily seen, the same as in the construction first described.

In each of the two forms of our invention above described it will be seen that the liquid in the reservoir 25 is subjected to substantially atmospheric pressure only and that the piston 23 moves in a vertical plane and makes a joint with the reservoir at a level above that of the liquid therein under all conditions of operation. The leakage due to the hydraulic pressure instituted when strain is exerted upon the piston will therefore pass into the reservoir and the liquid therein not being exposed to pressure and having no avenue of escape to the exterior there will be no waste of liquid in operation.

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

1. In a draw-gear or buffing apparatus, the combination of a preliminary spring resistance element, a secondary hydraulic-pressure resistance element, and means for independently and successively exerting strain upon the spring resistance and hydraulic-pressure resistance elements.

2. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary spring resistance element acted on by movements of the draw-bar through a preliminary range of traverse, and a secondary hydraulic-pressure resistance element, which is inactive during the preliminary traverse of the draw-bar and is acted on by movements thereof through a further or final range of traverse.

3. In a draw-gear or buffing apparatus, the combination of a draw-bar, follower-plates independently movable therewith, a preliminary spring interposed between the follower-plates, draw-bar stops forming abutments for the follower-plates, a hydraulic-pressure device, and connections through which the hydraulic-pressure device is actuated by the draw-bar independently of the action thereof upon the preliminary spring.

4. In a draw-gear or buffing apparatus, the

combination of a draw-bar, follower-plates independently movable therewith, a preliminary spring interposed between the follower-plates, draw-bar stops forming abutments for the follower-plates, a hydraulic-pressure device, and connections through which the hydraulic-pressure device is actuated by the draw-bar in the final portion of its traverse under strain, and which are inoperative throughout a determined preliminary range of traverse of the draw-bar.

5. In a draw-gear or buffing apparatus, the combination of a draw-bar, follower-plates independently movable therewith, a preliminary spring interposed between the follower-plates, draw-bar stops forming abutments for the follower-plates, a fluid-pressure cylinder, a piston fitting therein, a fluid-reservoir, a limited release-port leading from the cylinder to the reservoir, a check-valved passage connecting the cylinder and reservoir, and a pivoted actuating-lever, abutting on the piston and having an arm adapted to be moved by the draw-bar.

6. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary spring resistance element acted on by movements of the draw-bar through a preliminary range of traverse, a hydraulic-pressure device, a triple-armed lever having one end of its central arm abutting on the piston of the hydraulic-pressure device and the opposite end adapted to be moved by the draw-bar, and fixed pivot-pins against which the lateral arms of the lever bear, without positive connection, so that either may serve as a fulcrum for the lever, as determined by the direction of traverse of the draw-bar.

7. In a draw-gear or buffing apparatus, the combination of a draw-bar, a preliminary spring resistance element acted on by movements of the draw-bar through a preliminary range of traverse, a hydraulic-pressure device, a triple-armed lever having one end of its central arm abutting on the piston of the hydraulic-pressure device and the opposite end within a slot in an extension of the draw-bar, said slot admitting of a determined range of traverse of the draw-bar without action upon the lever, and fixed pivot-pins against which the lateral arms of the lever bear, without positive connection, so that either may serve as a fulcrum for the lever, as determined by the direction of traverse of the draw-bar.

8. 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 through a preliminary range of traverse, a hydraulic-pressure device, and an actuating device therefor which is connected to the draw-bar and operative during a further range of traverse thereof than that which corresponds with the limit of resistance of the preliminary spring.

9. In a draw-gear or buffing apparatus, the combination of a draw-bar, a fluid-pressure cylinder, a piston fitting therein and subject, in operation, to pressure on one side from the draw-bar and to hydraulic pressure on the other side, a liquid-reservoir subject substantially to atmospheric pressure, and means whereby leakage due to the hydraulic pressure on the piston will pass from the cylinder to the reservoir, without waste to the exterior thereof.

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