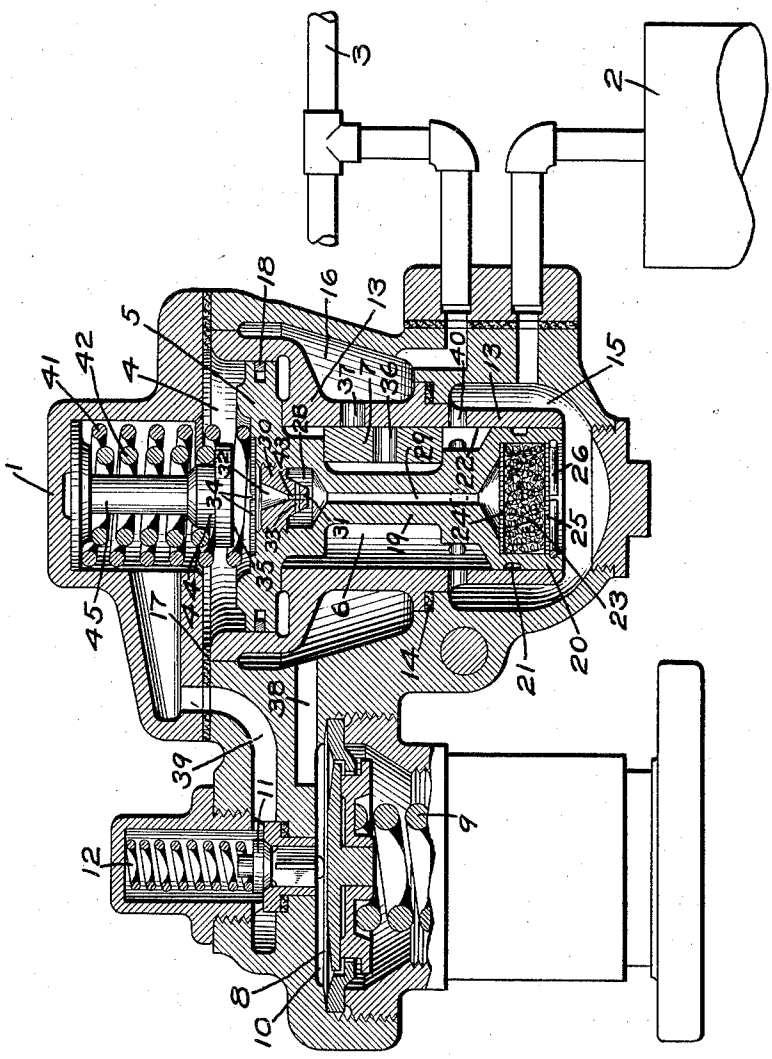
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FEED VALVE DEVICE

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FEED-VALVE DEVICE

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This invention relates to fluid pressure brakes and more particularly to a feed valve device for supplying fluid under pressure to the brake pipe.

In the usual feed valve device, means are employed for permitting a flow of fluid at main reservoir pressure from the slide valve side of the supply piston to the opposite side of said piston. Said means, in some cases, comprise a loose fitting supply piston, which permits fluid to leak through the clearance space between the piston and piston cylinder. It has also been proposed to employ a feed valve construction, in which the supply piston is fitted with a piston packing ring to prevent leakage around the piston and to provide a passage in the feed valve casing to connect the opposite sides of the supply piston, said passage containing a choke plug to restrict the flow of the fluid.

The fluid under pressure in the main reservoir usually contains oil vapor and perhaps other foreign matter, and with either type of feed valve construction described above, said foreign matter tends to collect either when the fluid expands after leaking around the loosely fitting piston or after flowing through the choke in the passage connecting opposite sides of the supply piston. In both cases, the accumulation of oil and foreign matter, which is more or less viscous and gummy, effects the operation of the feed valve device by making said operation sluggish or even causing a failure to operate.

The principal object of my invention is to provide an improved feed valve device in which the above difficulty is overcome.

In the accompanying drawing, the single figure is an elevational view, partly in section, of a feed valve device, embodying my invention.

The feed valve device 1 comprises a casing having a piston chamber 4 containing a piston 5 and a valve chamber 6 containing a slide valve 7. The regulating portion of the feed valve device comprises a flexible diaphragm 8, subject on one side to the pressure of an adjustable coil spring 9 and on the opposite side to the fluid pressure in chamber 10, and said diaphragm is adapted to control the operation of a regulating valve 11, subject to the pressure of a spring 12.

The supply piston 5 and slide valve 7 are contained in a removable bushing 13, adapted, when assembled in the feed valve casing 1, to seal against a gasket 14 to form chambers 15 and 16, and at another point to seal against a gasket 17 to separate piston chamber 4 from chamber 16.

The supply piston 5 and slide valve 7 are normally held in the position shown in the drawing by the pressure of the spring 41. After a predetermined degree of upward movement of said piston and slide valve, the piston engages the face 35 of a spring retainer 44, which is adapted to slide on the pin 45. Further upward movement of said piston is then opposed by the combined pressures of springs 41 and 42.

The supply piston 5 is provided with a piston packing ring 18, adapted to prevent leakage around the piston from valve chamber 6 to piston chamber 4. Connected to the piston 5 by a stem 19 is a cylindrical guide 20 having a spiral cut groove 21, guide 20 engaging surface 22 of the removable bushing 13.

The cylindrical guide 20 has a chamber 23 containing pulled curled hair held in place between two perforated plates 24 and 25. The plate 24 rests against a shoulder in the chamber 23, while the plate 25 is held in place by a spring ring 26 adapted to expand into an annular groove cut in the wall of chamber 23.

In the supply piston 5 is a chamber 28 connected to chamber 23 in the guide 20 by passage 29 and containing a choke plug 30 having screw-threaded engagement in said piston.

The choke plug 30 has a conical end through which a centrally disposed port 31 is provided which connects chamber 28 with a conical opening 32, which opens to piston chamber 4. Disposed at right angles to the port 31 and at right angles to each other are two cross ports 33 which open into the port 31.

Two slots 34, at right angles to each other, are provided in the piston face, so that when said piston engages the spring retainer face

35, communication between the port 32 in the piston 5 and the piston chamber 4 is not cut off.

The slide valve 7 is provided with a port 36 adapted, in the feed position of said slide valve, to register with a corresponding port 37 in the slide valve seat.

In operation, with the brake pipe 3 charged to the adjustment of the regulating spring 9, the pressure in diaphragm chamber 10, which chamber is in constant communication with the brake pipe 3 by way of passage 38 and chamber 16 around the removable bushing 13, operates the diaphragm 8, so as to permit the pressure of spring 12 to hold the regulating valve 11 closed. Fluid is supplied from the main reservoir 2 to chamber 15 and thence through a plurality of ports 40, in the removable bushing 13, to slide valve chamber 6. Fluid at main reservoir pressure in chamber 15, also flows through the pulled curled hair in chamber 23 of the piston guide 20, to passage 29 and thence through the ports 31, 33, 43, and 32 into piston chamber 4, and since the regulating valve 11 is seated, the pressures equalize on the opposite sides of the supply piston 5, thereby permitting the pressure of spring 41 to hold said piston and slide valve 7 in the position shown in the drawing.

If the pressure in the brake pipe 3 becomes less than the standard pressure carried in the brake pipe, as determined by the adjustment of the regulating spring 9, said pressure being effective in chamber 10 on the diaphragm 8, said diaphragm is operated by spring 9 to unseat the regulating valve 11.

When the regulating valve 11 is unseated, fluid under pressure in piston chamber 4 is vented through passage 39, past the regulating valve 11, into diaphragm chamber 10 and thence through passage 38 and chamber 16 to the brake pipe 3. The supply piston 5 is then operated by the higher pressure of the main reservoir fluid in valve chamber 6 to shift the slide valve 7, so that port 36 registers with port 37 in the slide valve seat. Fluid at main reservoir pressure in valve chamber 6 is thus permitted to flow through ports 36 and 37 into chamber 16 and thence to the brake pipe 3, charging said brake pipe.

When the pressure in the brake pipe 3 and in the diaphragm chamber 10 is increased, by flow through ports 36 and 37, to the standard pressure, the diaphragm 8 is operated by the pressure in chamber 10, so as to permit the pressure of spring 12 to seat the regulating valve 11. Fluid at main reservoir pressure in chamber 15 then flows into piston chamber 4. Upon equalization of the fluid pressures on opposite sides of the piston 5, springs 41 and 42 operate to return the piston 5 and slide valve 7 to the position shown in the drawing, in which the supply of fluid from the main reservoir 2 to the brake pipe 3 is cut off.

By providing pulled curled hair in chamber 23 of the piston 5 through which all fluid must pass before passing through the choke plug 30, suspended moisture, oil vapor or other foreign matter in the air supply tends to be separated from said air, thereby protecting the choke plug 30 from becoming closed up or restricted. It will be noticed that the choke plug 30 is provided with a plurality of ports through which fluid can flow from the chamber 28 to piston chamber 4, each port being of the same flow area as the port 43 between the conical opening 32 and the cross ports 33, the port 43 being the port that determines the rate of flow. With this construction, in case one or more ports become clogged, the rate of flow through the port 43 will remain unimpaired so long as one of the ports 31 or 33 remain unclogged. The conical end of the plug 30, in which are the five openings, also tend to separate foreign matter from the air, in that said foreign matter tends to flow past the openings 33 and gather in the chamber 28. The conical opening 32, which connects with the port 43, has also been found to be efficient in preventing condensed oil from restricting the port 43, in that the shape of said port permits a gradual expansion of the fluid under pressure flowing from passage 43, with the result that condensation is retarded so as to occur near the upper end of said port 32, instead of adjacent to the port 43, whereat it would gradually close said port.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a feed valve device, a supply valve for controlling the supply of fluid under pressure to an outlet, a piston and piston stem for operating said valve, said piston having an axially disposed chamber open to an axially disposed passage through said stem, and a removable plug in said chamber provided with a restricted port to permit the restricted flow of fluid through said passage and said restricted port to the chamber at the outer face of said piston and means operated upon a reduction in outlet pressure for venting fluid from said last mentioned chamber.

2. In a feed valve device, a supply valve for controlling the supply of fluid under pressure to an outlet, a piston and piston stem for operating said valve, said piston having an axially disposed chamber open to an axially disposed passage through said stem, and said stem having an axially disposed chamber at its outer end open to said passage, a removable plug in the chamber in the piston provided with a restricted port, and an air strainer mounted in the chamber in the stem, to permit the flow of fluid

through said strainer, said longitudinal passage, and said restricted port to the chamber at the outer face of said piston and means operated upon a reduction in outlet pressure for venting fluid from said last mentioned chamber.

In testimony whereof I have hereunto set my hand.

JOHN B. WRIGHT.