Aug. 6, 1929. LEROY W. SHUTTS 1,723,382

HYDRAULIC VALVE MECHANISM

Filed March 28, 1927

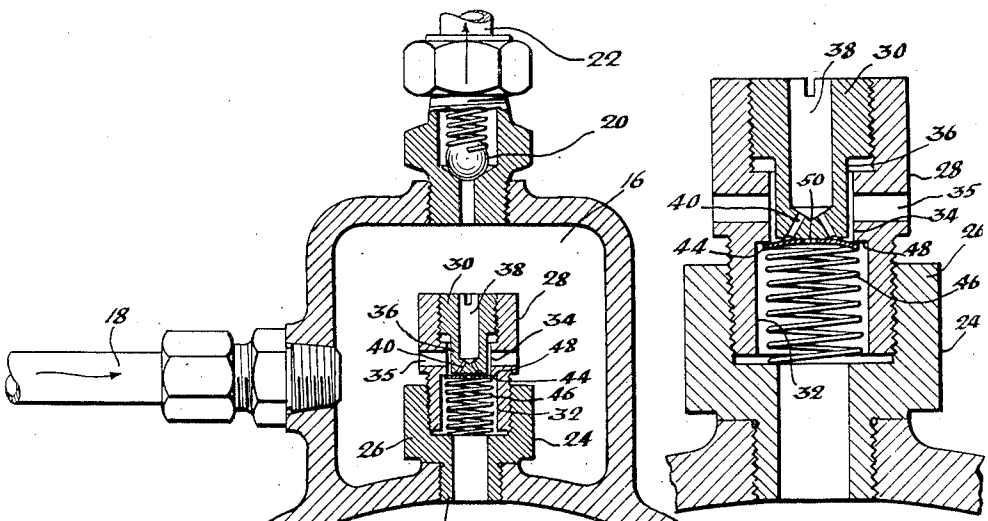


Fig. 2.

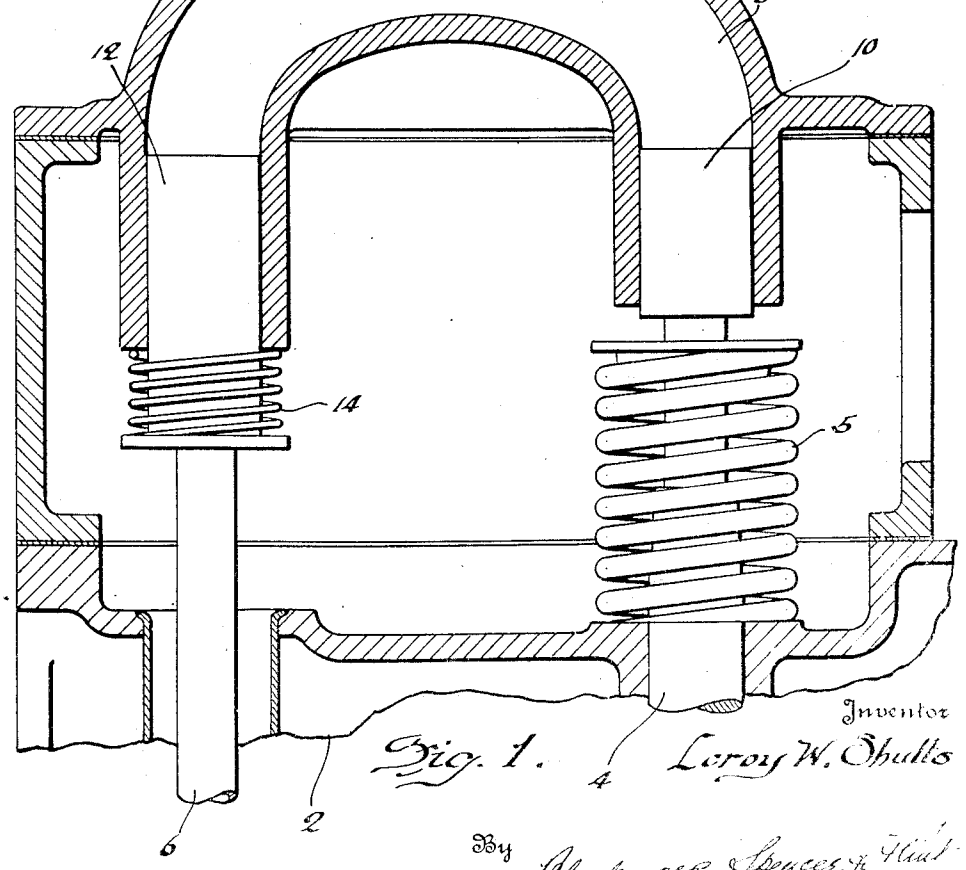


Fig. 1.

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HYDRAULIC-VALVE MECHANISM.

Application filed March 28, 1927. Serial No. 179,002.

This invention relates to an hydraulic valve gear of the type in which a body of oil is interposed between operating plungers, one of which is actuated by the cam shaft or equivalent mechanism and the other of which is arranged to operate the engine valve. It has particularly to do with an inlet valve arranged to permit the entrance of oil to maintain the hydraulic chamber filled and, at the same time, permit the escape of air which may collect in the upper portion of the hydraulic chamber. The valve gear is of the type disclosed and claimed in the prior application of George E. A. Hallett, Serial No. 126,297, filed July 31st, 1926, although it embodies certain novel features hereinafter claimed.

In the drawings, Figure 1 is a vertical section thru such an hydraulic valve gear as applied to an overhead valve engine. Figure 2 is a detail of the valve mechanism with the parts in a slightly different position.

The reference character 2 indicates a portion of a conventional automobile engine of the type employing overhead valves, although it is to be understood that my invention is equally useful with L-head or V-type engines.

Reference character 4 indicates the stem of one of the usual poppet valves yieldingly held upon its seat by coil spring 5. 6 indicates a push rod operated by the usual cam shaft, not shown. 8 indicates an hydraulic chamber in which operate pistons 10 and 12. Piston 10 engages the upper end of the valve stem 4 while piston 12 engages the upper end of the push rod 6. A light spring 14 yieldingly urges the piston 12 downwardly and a similar spring may be provided for the piston 10. Above the hydraulic chamber 8 is arranged a reservoir 16 supplied with oil from any suitable source, such as the usual oil pump, thru conduit 18. The reservoir 16 is provided with a pressure relief valve 20 permitting the return of oil through conduit 22 to the crankcase. At 24, I have indicated my improved valve. This valve is arranged at the highest point in the chamber 8 and consists of fitting 26 receiving screw plug 28 which, in turn, receives screw plug 30. The plug 28 is provided at its lower end with an axial bore 32 and at its intermediate portion with a bore 34 somewhat larger in diameter than the reduced end 36 of plug 30, but smaller in diameter than bore 32 forming a seat or shoulder 48. Radial passages 35 establish communication between bore 34 and chamber 16. The plug 30 is provided with an axial bore 38 from which small passages 40 lead to the lower face of the plug 30, at points spaced from the axis. Within the bore 32 is arranged a valve 44 of thin metal yieldingly urged upwardly by coil spring 46. This spring normally holds the valve 44 in engagement with the shoulder 48 provided at the junction of the bores 32 and 34. The reduced end 36 of plug 30 terminates short of the disc 44 in its normal position. Disc 44 is provided with a small central aperture 50.

The device operates as follows:

In normal operation, the push rod 6 is reciprocated by the cam shaft and effects reciprocating movement of plunger 12 which is conveyed to plunger 10 through the oil in the reservoir 8. By this means, the valve 4 is alternately opened and closed. Reservoir 16 is at all times full of oil under pressure and upon the return stroke of the piston 12 should the chamber 8 not be full of oil, oil will pass from the reservoir 16 through passage 35 and bore 34, depress valve 44 and pass around the valve through bore 32 into the chamber 8. Any air which may collect in the upper part of chamber 8 will tend to pass upwardly through aperture 50, passages 40 and bore 38 into the upper portion of the chamber 16 and thence be carried off through relief valve 20 and returned to the crankcase. The described discharge of air can take place even though the pressure in the chamber 8 be sufficiently great to hold disc 44 in engagement with shoulder 48 and consequently shut off passage of oil around the valve. However, it is undesirable to have the valve 44 open during the operating stroke of the plunger 12 even to the extent of having the restricted passage 50 uncovered. This is taken care of by the fact that the valve 44 is of very flexible material and when subjected to the full operating pressure in the chamber 8, is flexed upwardly sealing the aperture 50 by engagement with the lower end of plug 30.

While I have shown my improved valve used as both inlet and outlet valve, it is obvious that it may be used as an outlet valve only as in the Hallett application referred to.

I claim:

1. The combination of an hydraulic chamber, an operating member and an operated member working in the chamber, a fluid reservoir and a valve establishing communication between the reservoir and chamber, said valve comprising a main passage for the admission of the fluid to the chamber and an auxiliary passage of smaller size for the venting of air.

2. The combination of an hydraulic chamber, an operating member and an operated member working in the chamber, a source of fluid supply, and a valve interposed between said source and the chamber, said valve being provided with a main passage for the admission of fluid to the chamber and an auxiliary passage for the venting of air, and a valve member adapted to close one or both of said passages dependent upon the pressure in the chamber.

3. The combination of a hydraulic chamber, an operating member and an operated member working in the chamber, a body of fluid in the chamber for transmitting motion from the operating member to the operated member, a combined fluid inlet and air vent valve arranged at the highest point in the chamber, and a reservoir containing fluid under pressure with which said valve establishes communication.

4. The combination of a hydraulic chamber, an operating member and an operated member working in the chamber, a body of fluid in the chamber for transmitting motion from the operating member to the operated member, a reservoir containing fluid under pressure, and a valve for establishing communication between said chamber and reservoir provided with a plurality of passages, valve seats associated with each of said passages, a valve member cooperating with said seats, means for normally urging the valve member into engagement with one of said seats in opposition to the pressure in said reservoir, said valve member being operable to engage the second named seat when subject to the operating pressure of the hydraulic chamber.

5. The combination of a hydraulic chamber, an operating member and an operated member working in the chamber, a body of fluid in the chamber for transmitting motion from the operating member to the operated member, a reservoir containing fluid under pressure, and a valve for establishing communication between said chamber and reservoir provided with a plurality of passages, valve seats associated with each of said passages, a disc, a spring for urging the disc into engagement with one of the seats in opposition to the pressure in said reservoir, said disc being distortable to engage the second named seat when subject to the operating pressure of the hydraulic chamber.

In testimony whereof I affix my signature.

LEROY W. SHUTTS.