

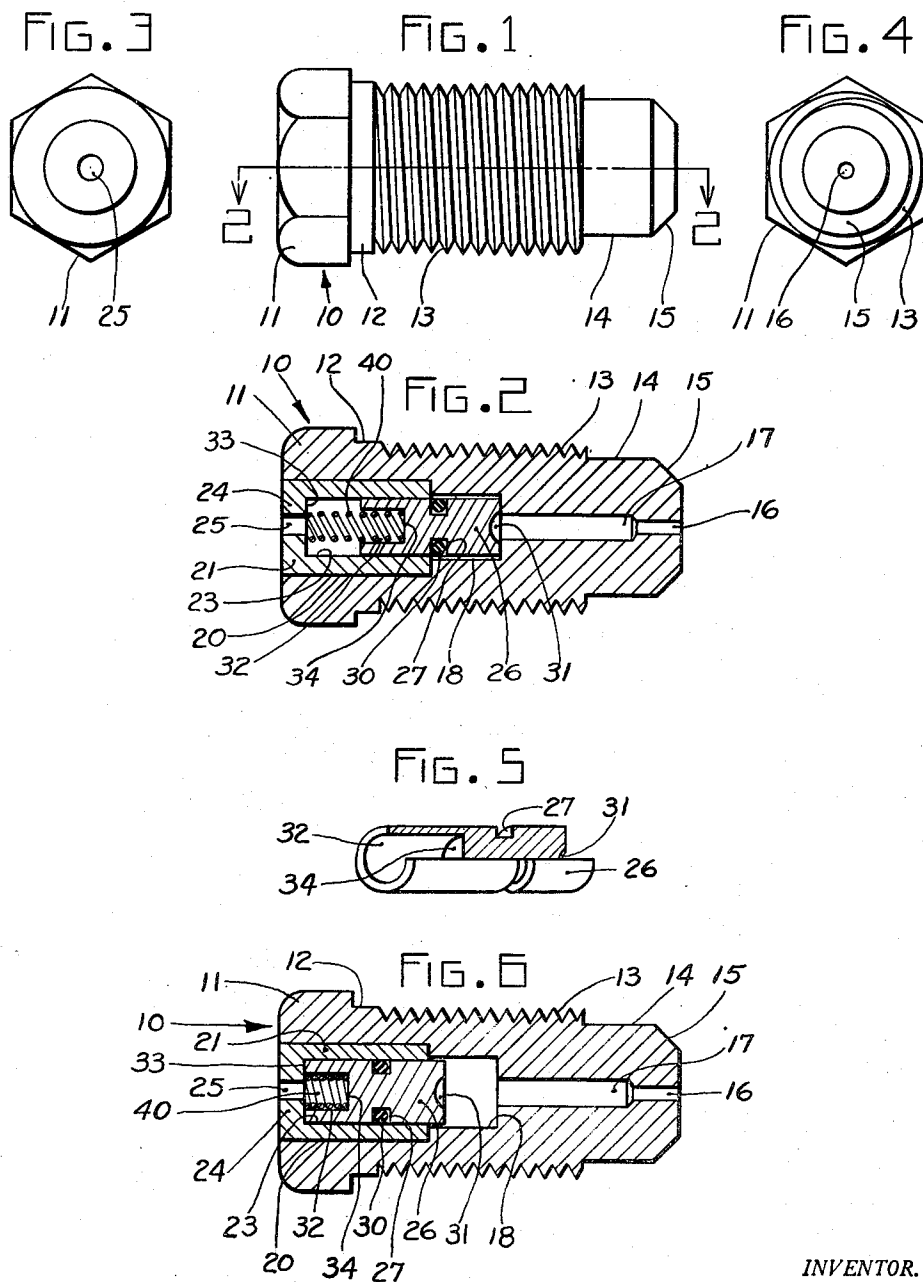
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AUTOMATIC AIR BLEEDER VALVE FOR HYDRAULIC SYSTEMS

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AUTOMATIC AIR BLEEDER VALVE FOR
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This invention relates to an automatic air bleeder valve for hydraulic systems and more particularly to a mechanism for automatically allowing entrapped air or gases to escape from hydraulic systems such as are employed in automobiles or machine tools.

One of the principal objects of the present invention is to provide an automatic air bleeder valve in a hydraulic system to permit the escape of the air which accumulates when liquid is added to the system.

Another object of the present invention is to provide an automatic air bleeder valve in a hydraulic system in which the initial supply of hydraulic liquid becomes immediately operative without the necessity of bleeding the far end of the system.

Still another object of the present invention is to provide an automatic air bleeder for hydraulic systems of machine tools wherein the hydraulic pressures vary widely, from low pressure when the machine tool is running idle to high pressures when the machine tool is running at rapid traverse speeds and is heavily loaded.

Other objects of the present invention will become apparent in part and be pointed out in part in the following specification and claims.

In the past, hydraulic systems employed a fixed type bleeder valve. It was located in the end of the line and a wrench was used to open the valve to allow air to escape. When liquid flowed out of the system, the wrench was again used to close the valve. The present invention obviates the use of manually employed wrenches or the like and permits the continuous and automatic escape of entrapped air which is a frequent source of trouble in hydraulic systems.

Like reference numerals refer to like parts in the accompanying drawings in which:

Figure 1 is a side elevational view of the new and improved automatic air bleeder valve for hydraulic systems.

Figure 2 is a longitudinal sectional view taken along line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a left hand end view of the new and improved automatic air bleeder for hydraulic systems.

Figure 4 is a right hand end view of the same.

Figure 5 is a perspective view partly in section of the valve piston.

Figure 6 is a longitudinal sectional view similar to Figure 2, showing the valve piston at the opposite end of the stroke from that shown in Figure 2.

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Referring to the drawing wherein a valve body, generally indicated by reference character 10, having its external surface in stepped formation, consists of hexagonal head 11 adjacent a shoulder 12, with an intermediate section threaded as at 13, and reduced portion 14 terminating in a tapered end 15.

Internally, valve body 10 has an axial bore starting at 16 and extending throughout its length. Said bore is of stepped diameter and includes a counterbore 17, an enlarged valve piston bore or cylinder 18 and a bushing receiving recess 20.

A bushing 21 is provided having a driving fit, so as to be secured in bushing receiving recess 20. Bushing 21 is provided with a piston bore 23, the back wall 24 of which has an air escape port 25.

A valve piston 26 having an annular external recess 27 adapted to house a neoprene or other type resilient annular sealing member 30 is provided with a concaved recess 31 in one end and a counterbored spring retaining opening 32 in its other end. A spring 40 is provided in this spring retaining opening 32, one end of this spring pressing against the base 33 on one end and against base 34 of piston bore 23 on the opposite end.

In order to more clearly understand the principle upon which the present invention operates I will specify a few dimensions. It is to be clearly understood that these dimensions are by way of example only and are not limitations on the present invention. Enlarged valve piston bore 18 is assigned a dimension of 1.000". Piston sleeve surface 23 is assigned a diameter dimension of .950". Valve piston 26 is assigned a diameter dimension of .900". Two observations are presented. Air has negligible viscosity. Hydraulic liquid possesses the property of relatively high viscosity.

In operation, tapered end 15 is inserted into the line of a hydraulic system. A conventional union (not shown) will unite threads 13, hence valve body 10, to the line.

In starting up the system air will escape between valve piston 26 and enlarged valve piston bore 18, past O ring 30 into piston bore 23 and out air escape port 25. Just as soon as liquid under pressure acts against concaved recess 31, valve piston 26 is moved rearwardly into the position shown in Figure 6 wherein the liquid pressure will act on O ring 30 forming a liquid tight seal with piston bore 23.

In order for air to escape after the ring 30 forms a liquid tight seal, the piston 26 must return to the position shown in Figure 2 wherein

no liquid is acting against concaved recess 31 with sufficient pressure to cause movement of valve piston 26. O ring 30 is then unaffected by the liquid pressure. Therefore, air may bypass around valve piston 26 as hereinbefore described.

In view of the foregoing description of the construction it will therefore be seen that the invention provides an automatic air vent and liquid sealing valve which when installed in hydraulic systems will automatically bleed entrapped air without loss of hydraulic liquid.

Having shown, described and illustrated a preferred embodiment of our invention, we do not wish to limit ourselves to the exact structure shown inasmuch as mechanical structural changes can be made without departing from either the spirit or scope of the invention.

What I claim is:

1. In an automatic air bleeder valve for hydraulic systems, a valve body provided with means for attachment to a hydraulic line, said valve body being provided with an axial bore, a counterbore contiguous with said bore, an enlarged valve piston bore adjacent said counterbore terminating in a bushing receiving recess, a bushing having a piston bore and an air escape port secured in said bushing receiving recess, a valve piston provided with a circular external recess housing an O ring adapted to cooperate with said enlarged bore and said valve piston bore, a spring retaining recess in said valve piston, a spring coacting between the bottom of said valve piston recess and the base of said bushing bore and a concave recess in one end of said valve piston adapted to be acted upon by the liquid under pressure in said hydraulic line.

2. An automatic air bleeder valve for hydraulic systems having in combination a body centrally apertured to present shouldered cylinder portions of progressively greater diameters from one end to the opposite end, a bushing inserted and fixed in the cylinder portion of largest diameter, said bushing having an outlet escape port and an internal diameter slightly smaller than the diameter of the succeeding cylinder portion of the body, a piston movable lengthwise within said bushing and body, said piston having a clearance within said bushing such that air but not liquid may bleed past it, a sealing ring on said piston positioned to block the passage of air when the piston is moved into the bushing, but positioned to clear the bushing when the piston is moved into

the body cylinder portion, and a spring normally forcing said piston to a position where the sealing ring is without the bushing to permit the bleeding of air, but functioning when the piston is under hydraulic pressure to allow it to move into the bushing and to seal the said escape port.

3. An automatic air venting and fluid sealing valve for the purpose described, comprising a body member having a valve chamber formed therein, a pressure port and an aligned venting port facing one another in opposite end walls of said chamber and communicating therewith, said venting port being open to the atmosphere, a flow passage coaxial with said body member extending inwardly from one end thereof and communicating with said pressure port, a piston having a concaved recess at one end and slidable inside of said chamber for controlling the flow passage, resilient sealing means encircling said piston and between the piston and the side walls of said chamber, spring means within said chamber having one end acting against said piston and the other end bearing against the vented end wall of the chamber, said piston and sealing ring being in such clearance relationship with the side walls of said chamber as to normally permit passage of air therebetween yet be incapable of passage therebetween of a liquid, said piston being urged by said spring means to normally occupy a first position against the pressure ported end wall of said chamber with the recessed end of said piston over said pressure port for enabling the free communication and venting of air from said flow passage through said chamber to said atmosphere vent and a second position for closing the communication between said flow passage and said vent when the liquid pressure in the flow passage acting against the recessed end of the piston forces the piston against the pressure of said spring means into a retracted position to open said pressure port while simultaneously closing the communication between said flow passage and said vent by compression of said sealing means against the side walls of said chamber and said piston.

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