A hydraulic tappet is formed by a barrel having a closed end and a plunger reciprocal within the barrel. The plunger has an oil chamber and a cap is seated on one end of the plunger to close the oil chamber. Passage means are provided at the seat of the cap upon the plunger for the relief of air within the plunger chamber.
Figure 1.

Figure 2.

Figure 3.

Figure 4.

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TAPPET WITH MEANS FOR RELIEVING ENTRAINED AIR

SUMMARY OF THE INVENTION

This invention relates to means for removing entrained air from within a hydraulic tappet.

One purpose of the invention is a hydraulic tappet in which either the cap closing the plunger chamber or the plunger itself may have a series of notches for the relief of entrained air from within the plunger chamber.

Another purpose is a hydraulic tappet of the type described in which the notches are formed in the plunger.

Another purpose is a hydraulic tappet of the type described in which notches for the relief of entrained air from within the plunger are formed in the cap closing the end of the plunger.

Other purposes will appear in the ensuing specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated diagrammatically in the following drawings wherein:

FIG. 1 is a vertical section through a tappet of the type described,

FIG. 2 is a bottom plan view of the cap in Figure 1,

FIG. 3 is a top plan view of the plunger of a modified form of tappet, and

FIG. 4 is a side view of the plunger illustrated in Figure 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The advent of extreme pressure additives to engine lubricants, higher engine speeds and higher engine temperatures have made automotive engine lubrication oils somewhat susceptible to the phenomenon known as aeration. Aeration can occur when a vehicle undergoes rapid acceleration or rapid braking, causing the oil in the engine sump to collect preferentially in such a position as to cause the oil pump to entrain a combination of air and oil. If an excess of air is entrained within the oil, and the oil is delivered to a hydraulic valve lifter or tappet and taken into the low-pressure chamber of the tappet, and subsequently into the high-pressure chamber, the oil and air mixture may compress during operation causing excessive valve train lash and essentially defeating the purpose of the tappet. The present invention provides a simple and reliably operating means for the relief of entrained air from within the low-pressure chamber of a hydraulic tappet.

In FIG. 1 a generally cylindrical tappet barrel is indicated at 10. The tappet barrel has a closed end 12. The engine cylinder wall is indicated at 14 and the oil gallery is indicated at 16.

Reciprocally mounted within the barrel 10 is a plunger 18. The lower end of the plunger is closed by a valve 20 held in position by a valve cage 22. A coil spring 24 positioned between the lower end of the valve 20 and the valve cage biases the valve 20 toward the plunger bottom. A spring or the like 26 bottoms against the barrel closed end 12 and urges the valve cage 22 against a lower surface 28 of the plunger 18.

A seat 30 is formed at the upper end of the plunger and a cap 32 is positioned upon the seat. The cap 32 may have an annular flange 34 which overlies and rests upon the plunger seat. The body portion 36 of the cap extends downwardly within the low pressure chamber 38 of the plunger 18.

Oil from the gallery 16 may pass through a port 40 in the barrel and then through a port 42 in the plunger to enter the chamber 38 within the plunger. As illustrated in Figure 2, the lower surface of the flange 34 may have a series of notches 44 which form passages between the low-pressure chamber 38 within the plunger and the open area above the cap 32. As stated above, there are serious operational problems if excessive air is entrained within the oil in the low-pressure chamber 38 and in turn taken into the high-pressure chamber below cage 22 and surrounded by the lower portion of the closed barrel 10. During tappet operation, movement of the plunger will compress the air. The notches 44 provide means for passing air from the chamber 38 to the atmosphere. The body portion 36 of the cap 32 is slightly smaller than the plunger area adjacent the cap. Hence, there is a space 46 which communicates with the notches 44 and with the chamber 38 to permit the air to reach the notches.

FIGS. 3 and 4 show a modified form of the invention. The upper seat 30 of the plunger has a series of notches 50 which also provide communication between the low pressure oil chamber 38 and the atmospheric space above the cap 32.

The notches or passages can be formed either in the lower surface of the cap which seats upon the plunger, or upon the plunger seat itself. In some applications it may be desirable to have notches both on the cap and on the upper end of the plunger at its seat. What is important is to provide sufficient passage space to relieve the entrained air from the oil and the plunger chamber, but yet not such a large passage area that oil will be lost from the chamber. Under normal operation the air will rise to the surface or toward the top of chamber 38 and the operation of the reciprocal plunger within the barrel will cause this air to be forced upwardly through space 46 and then through the notches either in one or both of the plunger and its associated cap.

Whereas, the preferred form of the invention has been shown and described herein, it should be realized that there are many modifications, alterations and substitutions thereto.

We claim:

1. In a hydraulic tappet, a barrel closed at one end and open at the other end, and oil passage in the barrel, a plunger reciprocally within the barrel, a chamber between the barrel closed end and the plunger, spring means within the chamber biasing the plunger toward the barrel open end, a chamber within the plunger, an oil passage in the plunger connecting the plunger chamber and the barrel oil passage to permit oil to flow from outside the barrel into the plunger chamber, a seat at the end of the plunger spaced from the barrel chamber, said plunger oil passage being spaced from said plunger seat, a cap positioned on said plunger seat, and at least one passage located at the plunger seat for the relief of air within the plunger chamber.

2. The structure of claim 1 further characterized by a plurality of passages formed in the plunger seat.

3. The structure of claim 2 further characterized in that said passages are formed by notches in the plunger seat.

4. The structure of claim 1 further characterized by a plurality of passages located in the cap adjacent the plunger seat.

5. The structure of claim 4 further characterized in that said passages are formed by a plurality of notches in that portion of the cap positioned on the plunger seat.

6. The structure of claim 5 further characterized in that said cap includes a flange overlying and positioned upon the plunger seat, said notches being formed in the flange.

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