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INTAKE VALVE VENT MEANS

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This invention relates to means for preventing the flow of fluids between separate chambers having different pressure conditions therein and has particular application to engines having valve guide means extended within induction passages wherein the pressure differential between the ends of such guide means causes lubricant to flow into the engine's induction system.

This invention is a continuation-in-part of both of the copending applications Serial Number 513,295 entitled "Intake Valve Vent Means," filed June 6, 1955, now abandoned, and Serial Number 566,512 entitled "Valve Guide Vent Means," filed February 20, 1956, now abandoned, both filed in the name of this same inventor. In overhead valve engines having valve guide means extending from the rocker arm chamber to within the intake manifold, at engine conditions causing a high intake manifold suction, lubricant is drawn through the guide means from the rocker arm chamber and is inducted into the combustion chambers of the engine where it is burned and lost.

It is here proposed to provide improved valve guide vent means which will reduce the pressure differential between the ends of the valve guiding means and prevent the loss of lubricant heretofore experienced. It is proposed to have the reciprocal valve stem member, or the valve guide means, formed to include an elongated annular groove and to have such groove in continuous communication with the atmospheric venting means, during the reciprocal travel thereof.

In the drawings:

Figure 1 is a fragmentary section of an engine, cut away and having parts shown in cross-section to illustrate the present invention.

Figure 2 is an enlarged cross-sectional view of the proposed atmospheric valve guide vent means.

Figure 3 is a cross-sectional view of the proposed vent means taken from Figure 2 in the plane of line 3—3 and looking in the direction of the arrows thereon.

Figure 4 is a modification of the invention shown in Figure 1 showing the proposed vent means with the groove in the valve guide.

In the drawings there is shown a fragmentary section of an overhead valve engine 10 including the engine block 12 and head 14. Within the engine head is provided an induction system comprising a combustion chamber 16 and intake manifold passage means 18. An overhead intake valve 20 is extended through a wall 21 and into the intake manifold passage 18, and the valve head 22 separates the intake passage 18 from the combustion chamber 16. The intake valve stem 24 is received within a valve stem sleeve guide 26 provided in the engine head 14. The valve stem 24 and guide 26 extend upward into a rocker arm chamber 28 which is closed by a cover 30. The intake valve 20 is biased by spring means 32 and is actuated by a push rod 34 through a rocker arm 36 in a conventional manner.

Piston means 38 travels within the cylinder 40 formed in the engine block 12 and the usual spark plug means 42 is provided through the wall of the head and extended within the combustion chamber 16.

The chamber 28 receives lubricating oil in order to maintain the movable parts therewithin in proper operating condition. This space, during engine operation, is filled with a fine mist of lubricating oil vapors which tend to collect on the lower walls of the chamber 28 and members such as the valve stem 24 and guide 26 extended therewithin. Under certain engine operating conditions, there is a high vacuum condition within the intake manifold passage 18 and at such times the pressure condition in the intake manifold 18 is much lower than it is in the chamber 28 and there is a tendency for valve stem lubricant down into the intake manifold from where it is carried to the combustion chamber 16, burned, and lost.

To prevent the aforesaid loss of lubricating oils, the working space 44 between the valve stem 24 and its respective guide 26 is vented to the atmosphere by means of a vent passage 46 provided through engine head 14, wall 21, and guide 26. There is also provided an elongated recess or groove 50 about the valve stem 24 which communicates with the vent passage 46. The groove 50 is such in length as remains in communication with the vent passage 46 during the full stroke of the valve means 24; 26; the closed position being shown by Figure 1 and the open position by Figure 2.

Under high intake manifold vacuum conditions, the vent passage 46 prevents the high suction pressure normally within the space 44, between the valve stem 24 and guide 26, from existing about the valve stem and extending into chamber 28, and consequently, eliminates the drawing of excess lubricant from chamber 28 through space 44, into the intake passage.

A modification of the above-described vent means is shown in Figure 4 wherein the communicating groove 52 is located in the valve stem guide 54 instead of the valve stem itself. In this modification the valve stem extends through the valve guide 54 in a similar manner and the groove 52 provides atmospheric pressure about the valve stem to prevent the flow of lubricant therealong.

Under normal engine operating conditions reciprocation of the valve stem 24 within its guide provides a film of lubricant about the valve stem. Since there is no appreciable pressure differential between the chamber end of the valve stem passage 44 and the atmosphere end to the vent passage 46, and what pressure difference there is exists at the intake manifold end of the valve stem passage, no lubricant will be lost through the vent passage 46 and no lubricant will be drawn into the intake manifold, under normal operating conditions, other than previously occurred. However, under high intake manifold conditions, the valve stem passage 44 being vented to atmosphere between the chamber 28 and the intake manifold 18, permits no lubricant to be drawn into passage 44, due to the high manifold suction, other than that which is normally occasioned by valve stem reciprocation.

I claim:

1. In an engine having intake valve stems extending through a wall separating a lubrication space from engine induction passages and wherein the difference in the pressure condition within said induction passages as compared to the pressure condition within said lubrication space produces a negative pressure condition about the ends of said valve stems received within said lubrication space which normally induces the flow of lubricant about said valve stems from said lubrication space to said induction passages and results in the subsequent loss thereof, atmospheric vent passages formed through the side wall of said engine and through said separating wall and terminating in open communication with each of said intake valve stems individually for providing an atmospheric pressure condition about said valve stems intermediate said lubri-
cation space and said induction passages more nearly similar to the pressure condition within said lubrication space and thereby substantially eliminating the negative pressure condition about the ends of said valve stems within said lubrication space inducing the flow and loss of lubricant to said induction passages.

2. An engine having a lubrication space and induction passages provided therein and dividing walls separating said lubrication space from said induction passages, intake valve stems journaled within said dividing walls and extending between said lubrication space and said induction passages, said engine having a negative pressure condition within said induction passages and about said valve stems, including the end thereof received within said lubrication space, normally inducing the flow of lubricant from said space to said passages during the operation of said engine, and atmospheric vent passages formed through the side wall of said engine and through said dividing walls and terminating in open communication with each of said intake valve stems individually for providing an atmospheric pressure condition about said valve stems intermediate said lubrication space and said induction passages more nearly similar to the pressure condition within said lubrication space and thereby substantially eliminating the negative pressure condition about the ends of said valve stems within said lubrication space inducing the flow and loss of lubricant to said induction passages.

3. An engine having a lubricating space and an induction passage, an engine wall separating said lubricating space and said induction passage, a valve stem and a valve stem guide extending through said engine wall and

having ends terminating between said lubricating space and said induction passage, the difference in pressure between said lubricating space and said induction passage producing a negative pressure condition about the end of said valve stem in said lubricating space and tending to induce the flow of lubricant along said valve stem from said lubricating space to said induction passage, and an atmospheric vent passage formed through said engine wall and said valve stem guide and terminating in open communication with said valve stem intermediate said lubricating space and said induction passage for providing an atmospheric pressure condition about said valve stem similar to the pressure condition in said lubricating space and preventing the flow of lubricant along said valve stem to said induction passage.

4. An engine as described in claim 3 wherein said atmospheric vent passage communicates with an annular groove formed in said valve stem.

5. An engine as described in claim 3 wherein said atmospheric vent passage communicates with an annular groove formed in the side wall of said valve stem guide.

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