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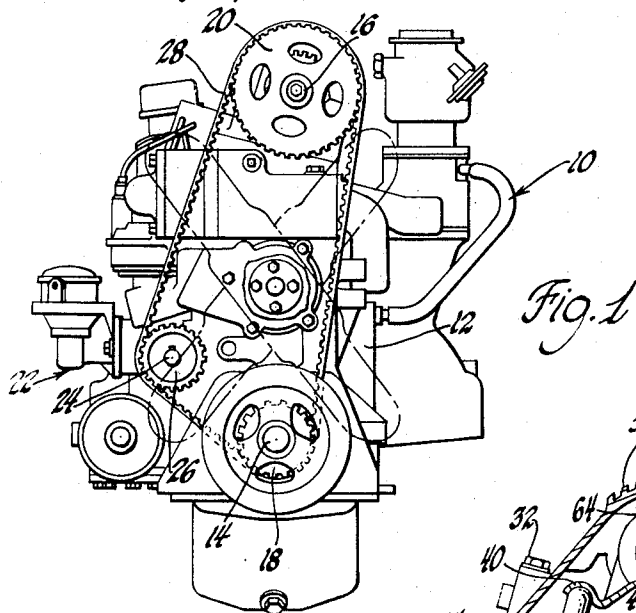
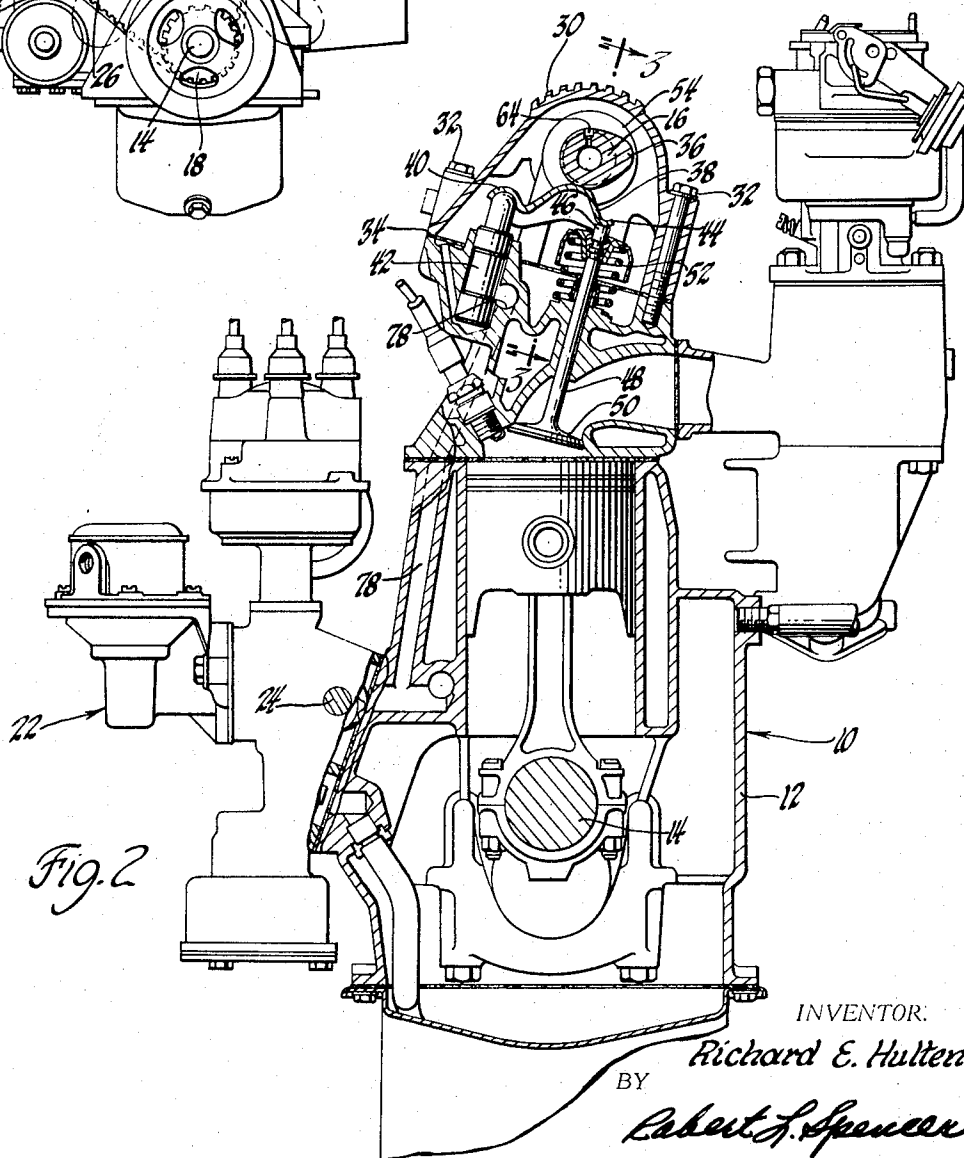
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CAMSHAFT CONSTRUCTION

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2 Sheets-Sheet 1



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CAMSHAFT CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

An internal combustion engine includes overhead valves actuated by rocker arms pivoted on hydraulic lash adjusters. An overhead camshaft actuatingly engages the rocker arms and is rotatably carried in journal pedestals integrally formed in a die cast rocker cover which sealingly engages the engine block to enclose the valve actuating mechanism. Oil lubrication is provided from a block gallery through one of the cover journal pedestals to distribution passages in the camshaft which supply metering jets in each of the cam lobes to lubricate the cams and other valve actuating mechanisms. A chain timing belt connects the engine crankshaft with sprockets on the camshaft and an auxiliary drive shaft to rotate these shafts in timed relationship.

This invention relates to internal combustion engines and more particularly to the construction of the camshaft and associated rocker cover.

The conventional method of journaling a camshaft in the engine block presents problems of assembly and repair which increase the cost of manufacturing and maintaining internal combustion engines.

It is an object of this invention to provide a rocker cover for an internal combustion engine in which a camshaft is journaled.

Another object of this invention is to provide an internal oil passage through the center of the camshaft for delivering oil under pressure to metering jets in the base circle of each cam for lubricating the contact between the cam and its associated rocker arm and also to discharge oil in the form of an oil fog within the space between the rocker cover and the engine block for lubricating the valve stems and tips located therein.

A further object of this invention is to provide integral journals in the rocker cover for rotatably supporting the camshaft therein and to provide an oil passage in one of the journal pedestals for conveying oil under pressure from the engine block to an annular groove formed in the mating bearing surface of the camshaft such that the pressurized oil may be fed to the internal oil passage of the camshaft through cross drilled holes in register with the annular groove.

These and other objects will be apparent as reference is made to the specification and drawings wherein:

FIGURE 1 is a front view of an internal combustion engine utilizing the present invention;

FIGURE 2 is a cross-sectional view of the internal combustion engine of FIGURE 1, with sections cut away, and illustrating the interrelation of the rocker cover, camshaft, rocker arm, lash adjuster, valve and piston;

FIGURE 3 is a view in the direction of the arrows substantially along the line 3—3 of FIGURE 2 showing the camshaft journaled in the rocker cover;

FIGURE 4 is a view in the direction of the arrows substantially along the line 4—4 of FIGURE 3, illustrating the rocker cover; and

FIGURE 5 is a view in the direction of the arrows substantially along line 5—5 of FIGURE 3 showing the interconnecting oil galleries of the engine block, oil passage of the rocker cover, annular groove of the cam-

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shaft journal and feeder passage and internal oil passage of the camshaft.

Referring now to the drawings, as best seen in FIGURES 1 and 2, an internal combustion engine indicated generally by the numeral 10 includes an engine block 12, a crankshaft 14 and a camshaft 16.

A crankshaft sprocket 18 and camshaft sprocket 20 are secured to the crankshaft and camshaft, respectively, for rotation therewith. An auxiliary units package 22 is secured to the engine block 12 and includes an auxiliary drive shaft 24 having an auxiliary drive shaft sprocket 26 secured thereto for rotation therewith. A chain timing belt 28 operably connects the crankshaft sprocket 18, camshaft sprocket 20 and auxiliary drive shaft sprocket 26 for rotating the respective associated shafts in phase during operation of the engine.

Referring now to FIGURES 2 through 5, the camshaft 16 is rotatably supported in a rocker cover 30. The rocker cover 30 is secured to the engine block 12 by a plurality of bolts 32 with a conventional gasket 34 positioned therebetween for sealing the juncture. A plurality of cam lobes 36 are formed integrally at spaced intervals longitudinally along the camshaft 16. Each cam 36 contacts a rocker arm 38 for actuating its associated valve mechanism. The valve mechanism includes the rocker arm 38 having a socket 40 on one end thereof fitted on the spherical head on the upper end of a conventional hydraulic lash adjuster 42 which serves as a pivot for the rocking arm 38. The other end 44 of the rocker arm is positioned on the tip 46 of a valve stem 48 of an engine valve 50. A compression return spring 52 is positioned about the valve stem 48 and biases the valve into contact with the rocker arm in a conventional manner.

As the camshaft 16 is rotated, each cam 36 successively pivots its respective rocker arm 38 about the spherical head of its associated lash adjuster 42 and overcoming the biasing action of the compression spring 52 moves its respective valve 50 longitudinally, thereby opening the valve in a normal manner. Upon further rotation, the return spring 52 maintains the tip 46 in contact with the end 44 of the rocker arm 38, closes the valve 50 and maintains the rocker arm 38 in contact with cam 36.

The camshaft 16 has a plurality of journals 54 integrally formed on the camshaft and positioned to be rotatably supported in mating journal pedestals 56 integrally formed in the rocker cover 30. An aperture 58 extending longitudinally in the center of camshaft 16 is threaded at each end and effectively sealed at each end by bolts 60 and 62, respectively. Bolt 60 and associated washer 63 also secured the keyed sprocket 20 to the end of camshaft 16 in abutting relation to the rocker cover 30. At the other end bolt 62 and washer 66 secure thrust washer 68 against rocker cover 30. A plug 70 is installed over bolt 62 with a tight fit against thrust washer 68 and rocker cover 30 for sealing against admission of undesirable dirt.

The aperture 58 serves as an integral oil passage for delivering oil under pressure to metering jets 64 extending from the aperture 58 to the surface of the base circle of each cam lobe 36. Oil under pressure is delivered to the internal oil passage 58 by a cross drilled hole 72 which extends from the passage to the surface of the associated journal 54.

An annular groove 74 is formed on the surface of journal 54 in register with the cross drilled hole 72. An oil passage 76 extends through the journal pedestal 56 and connects the groove 74 to an oil gallery 78 in the engine block 12 which carries oil under pressure for lubricating the engine and supplying oil to the camshaft.

During operation, the oil under pressure is sprayed from the metering jets 64 to create an oil fog in the space

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between the rocker cover 30 and the engine in block 12 and lubricates the point of contact of the cam 36 and rocker arm 38. The oil fog lubricates the valve stem for its longitudinal movement and the contact between the rocker arm 38 and valve tip 46.

Thus, it can be seen that by utilizing this invention a hollow camshaft may be used as an oil passage for the distribution of oil under pressure to lubricate the contacts between the cam surface and the rocker arm and to further lubricate operating mechanism in the area between the rocker cover and the engine block by means of an oil fog created by expulsion of oil through the metering jets.

By using the interior of the camshaft as an oil passage, manufacturing costs are reduced in the construction of the rocker cover by simplifying the design so that the cover may be produced by conventional die casting means. In the die casting of the rocker cover, the journal pedestals are cast integrally with the rest of the rocker cover and eliminate the need of additional nuts and bolts to secure bearing surface for supporting the camshaft journals.

By securing the bolts at each end of the camshaft after the shaft has been positioned in a rocker cover, the ends of the oil passage are effectively sealed and the camshaft is properly positioned within the cover for operation. Such an assembly reduces the cost of manufacturing and simplifies the assembly operation.

While but one embodiment of this invention is shown and disclosed it is obvious that variations may be had within the scope of the following claims.

I claim:

1. In combination in an internal combustion engine having an engine block,
 - a plurality of rocker arms,
 - a valve for each rocker arm movably supported in said engine block and having a valve tip contacting one end of the associated rocker arm for actuation thereby,
 - a lash adjuster for each rocker arm mounted in said engine block and contacting the other end of the associated rocker arm,

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a rocker cover removably mounted on said block and enclosing said rocker arms, said valves and said lash adjusters and

a camshaft rotatably journaled in said rocker cover and having a plurality of cams one engaging each of said rocker arms for actuation thereof,

whereby removal of said rocker cover from said engine block disengages said camshaft from engagement with said rocker arms.

2. The combination of claim 1 wherein said lash adjusters are hydraulically actuated to properly adjust the valve actuating mechanism during engine operation, when said mechanism is enclosed by said rocker cover.

3. The combination of claim 1 wherein said rocker cover comprises a die cast member sealingly secured to said engine block to define therewith a rocker compartment and a plurality of journal pedestals integral with said die cast member and disposed within said compartment, said camshaft being disposed within said compartment and having a plurality of journals received within said journal pedestals to rotatably support said camshaft.

4. The combination of claim 3 and further comprising an oil gallery in said engine block, oil distribution means in said camshaft to supply lubricant to said rocker compartment and an oil supply passage in one of said journal pedestals, said oil supply passage connecting said block oil gallery and said camshaft oil distribution means to supply lubricant to said camshaft oil distribution means.

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