June 2, 1964 R. E. HULTEN 3,135,254

INTERNAL COMBUSTION ENGINE

Filed Aug. 3, 1961 2 Sheets-Sheet 1

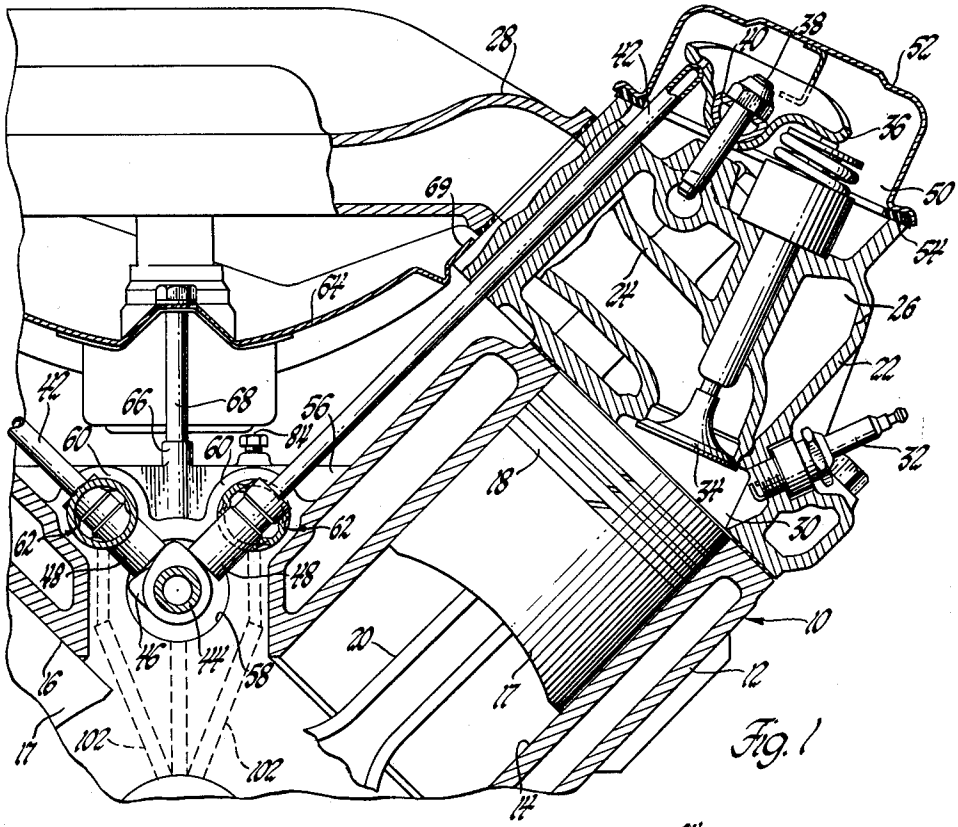


Fig. 1

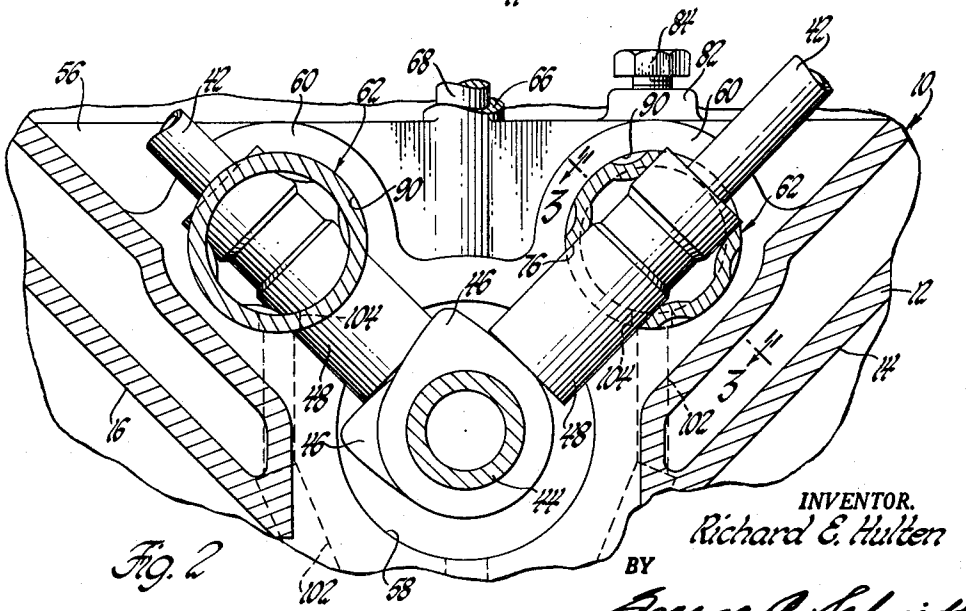


Fig. 2

INVENTOR.
Richard E. Hulten
BY
George C. Schmidt
ATTORNEY

June 2, 1964 R. E. HULTEN 3,135,254

INTERNAL COMBUSTION ENGINE

Filed Aug. 3, 1961 2 Sheets-Sheet 2

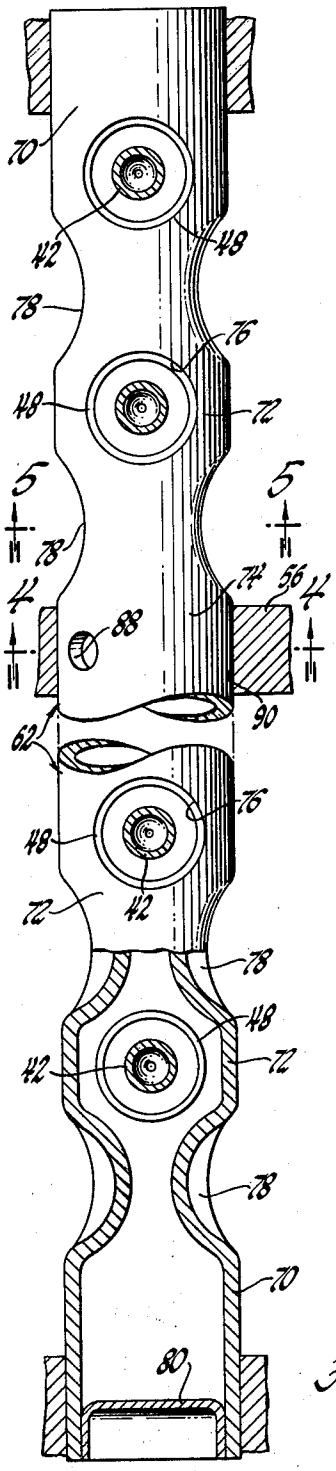


Fig. 3

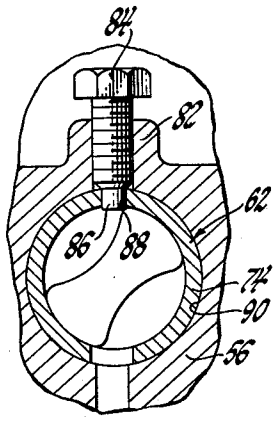


Fig. 4

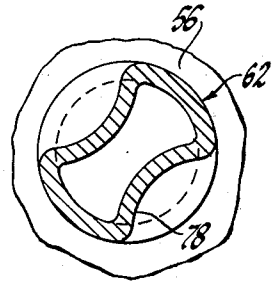


Fig. 5

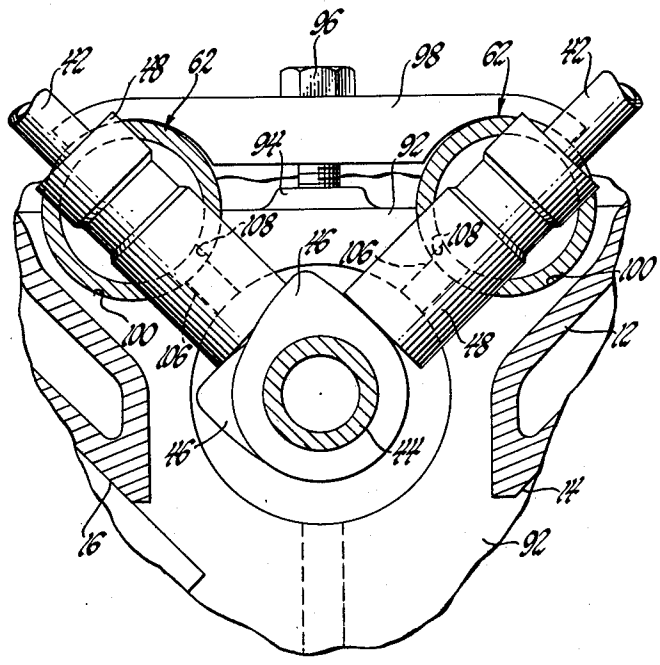


Fig. 6

INVENTOR.
Richard E. Hulten
BY
George A. Schmidt
ATTORNEY

United States Patent Office 3,135,254 Patented June 2, 1964

3,135,254

INTERNAL COMBUSTION ENGINE

Richard E. Hulten, Pontiac, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Aug. 3, 1961, Ser. No. 129,043
5 Claims. (Cl. 123—195)

This invention relates to internal combustion engines and more particularly to a means for lessening the amount of the material used in manufacturing the engine.

It is becoming more and more of a problem in the design and manufacture of internal combustion engines to provide a proper horsepower-to-weight ratio with the various materials presently being used in the forming of such engines and at the same time to fit within the size requirements presented. For example, a V-type internal combustion engine may be made of aluminum, but requires a great deal of material in order to provide the proper strength. It is thus desirable to eliminate certain amounts of the aluminum wherever possible in order to cut down the size of the finished product. Likewise, with an engine formed of cast iron it is desirable to eliminate as much excess metal as possible so long as strength is not sacrificed.

The device in which this invention is embodied comprises, generally, an internal combustion engine having the usual pistons, cylinders, valves and camshaft, and in which a great amount of the material adjacent and above the camshaft is eliminated. In order to accomplish this purpose, some means must be provided to guide and retain the valve lifters and valve push rods at the camshaft end. It is proposed to provide tubular members extending longitudinally of the engine, adjacent and parallel to the usual camshaft, for this purpose. The tubular members may be provided with valve lifter receiving openings and may be secured in the engine block so as to maintain the valve lifters in proper position with respect to the camshaft.

There are many advantages to a construction of this nature. By using tubular valve lifter guides a great amount of material is eliminated from the engine block which formerly was adjacent and above the engine camshaft. Further, the tubular members conveniently serve as lubrication passages for carrying lubricant to the valve lifters and to the camshaft and camshaft bearings.

These and other advantages will become more apparent from the following description and drawings, in which:

FIGURE 1 is a view of a portion of an internal combustion engine with parts broken away and in section to show the various parts;

FIGURE 2 is an enlarged view of a portion of the engine shown in FIGURE 1 to illustrate the camshaft and positioning of the tubular members;

FIGURE 3 is a cross-sectional view of the tubular member mounting of FIGURE 2 taken substantially along the line 3—3 of FIGURE 2 and looking in the direction of the arrows;

FIGURE 4 is a transverse cross-sectional view of the tubular member and mounting taken substantially along the line 4—4 of FIGURE 3 and looking in the direction of the arrows;

FIGURE 5 is a cross-sectional view of another portion of the tubular member taken substantially along the line 5—5 of FIGURE 3 and looking in the direction of the arrows; and

FIGURE 6 is a cross-sectional view of a portion of an engine such as illustrated in FIGURE 1, showing a modified form of securing the tubular members in the engine.

Referring more particularly to the drawings, FIGURE 1 best shows the internal combustion engine, illustrated generally by the numeral 10, in which the invention may

be embodied. Engine 10 is provided with an engine block 12 in which is formed a row of cylinders 14, or parallel rows 14 and 16. Mounted in each cylinder 14 is a piston 17 having the usual piston rings 18 and connecting rod 20. Mounted above engine block 12 is a cylinder head 22 in which are mounted the usual intake passages, as 24, and cooling passages, as 26, and exhaust passages, not shown. An intake manifold 28 is secured to the cylinder head 22 in any suitable manner and conveys the combustible charge through the intake passage 24 and to the combustion chamber 30. A suitable spark plug 32 is disposed in the cylinder head 22 to ignite the charge.

In order to permit the combustible charge to enter the combustion chamber 30, the usual intake valves, as 34, are provided in the cylinder head 22. A suitable exhaust valve is also provided in the well known manner. Valve 34 is driven through a rocker arm 36 that is pivotally secured in the cylinder head 22, as by stud 38 and pivot member 40. A suitable push rod 42 actuates the rocker arm 36 and causes the valve 34 to open and close at the proper time.

Push rod 42 is actuated by camshaft 44 mounted longitudinally in the engine block 12. Camshaft 44 is provided with a plurality of cams, as 46, causing valve lifter assemblies 48 to reciprocate the push rod 42. Valve lifters 48 may be of any well known construction.

The rocker arm gallery 50, in which are disposed the rocker arms 36 for the various valves, is covered by a sheet metal member 52 secured to cylinder head 22 in any suitable manner. A gasket 54 may be provided to seal the gallery 50.

Engine block 12 may be formed to provide one or more transverse walls 56 extending across the space between rows of cylinders 14 and 16. Wall 56 is provided with an aperture 58 permitting passage of the camshaft 44 and is also provided with bosses 60. Mounted in bosses 60 are the tubular valve lifter guide members, illustrated generally by the numeral 62. Guide members 62 extend longitudinally of the engine block 12 and are substantially parallel to the camshaft 44. These members will be hereinafter more fully described.

In between the end walls of the engine block 12 and the transverse walls 56, the block 12 is open to the crankcase extending along the bottom of the engine 10. In order to cover this area a sheet metal cover 64 is provided which extends between the opposite cylinder heads 22 and longitudinally of the engine. A suitable boss 66 may be formed in the wall or walls 56 to receive a stud 68, clamping the gallery cover 64 against the cylinder heads 22, as at 69. Cover 64 thus protects the interior of the engine block 12 and the usual crankshaft and crankcase therebeneath.

In FIGURES 3–5, the tubular valve lifter guide members 62 are best shown. Members 62 may have cylindrical portions, as at ends 70 and intermediate portions 72 and 74. Portions 72 are provided with transverse apertures 76 which receive the valve lifters 48 and maintain the valve lifters in proper location and angularity with respect to the camshaft 44. In between the portions 70 and 72, and 72 and 74 the tubular members 62 may be indented, as at 78, to add to the strength thereof. The ends of the tubular members 62 may be plugged by sheet metal cups 80, or the like, in the well known manner.

In order to secure the tubular members 62 in the engine block 12, bosses 82 may be formed in the transverse walls 56. A locking bolt 84 is threaded through the boss 82 and has an unthreaded end 86 which may be received in a suitable hole 88 in the tubular member 62. The tubular member 62 is thus secured against rotation and against lateral or longitudinal movement by the bolt 84.

The tubular members **62** pass through suitable apertures **90** formed through the bosses **60** in the transverse wall **56**.

Another method of securing the tubular members **62** in the engine block **12** is illustrated in FIGURE 6. As shown, the transverse wall **92** extends only part way above the camshaft **44**. A central boss **94** receives a bolt **96** which secures a cross member or clamp **98** against the tubular members **62**. Transverse wall **92** is provided with semicylindrical apertures **100** to receive the tubular members **62**.

Tubular members **62** also provide lubrication oil passages through the engine from end to end feeding oil to crankshaft, connecting rod, and camshaft bearings in addition to the valve mechanisms including the camshaft drive. As viewed in FIGURE 1 and shown in dotted lines, lubrication passages **102** may be provided in the transverse wall **56**, communicating with suitable apertures **104** in the tubular members **62**. Likewise, as illustrated in FIGURE 6, passages **106** may extend through transverse wall **92** to the camshaft area, communicating with apertures **108** in the tubular members **62**. The lubricant may be supplied at one end or the other of the tubular members **62** by the engine lubrication system.

It is thus noted that the engine block **12** is devoid of a great amount of material in the vicinity of the engine camshaft. The usual practice has been to provide solid metal above the camshaft and suitable bores formed therein to receive and guide the valve lifter assemblies. By using tubular members **62** it is unnecessary to provide this mass of material above the camshaft **44** and only a single or a few transverse walls, as **56** or **92**, would be required to support tubular members **62** serving the same function. This permits a great deal of weight elimination in the bulky and heavy engine block without sacrifice in strength. At the same time, adequate lubrication passages are provided to supply oil to the various engine components.

What is claimed is:

1. In an internal combustion engine having a camshaft and cylinders and pistons and valve means including valve lifters, an engine block including:

means for mounting said camshaft longitudinally thereof and adjacent said cylinders;

a plurality of walls extending transversely of said block and about said camshaft, said walls having openings therein receiving said camshaft; manually releasable securing means in each of said walls;

and a tubular member extending longtiudinally of said block and parallel to said camshaft and spaced therefrom, said tubular member being secured in said walls by said manually releasable securing means and having a plurality of transverse openings formed therethrough for receiving and guiding said valve lifters.

2. In an internal combustion engine having a camshaft and cylinders and pistons and valve means including valve lifters, an engine block including: means for mounting said camshaft longitudinally thereof and adjacent said cylinders; a plurality of walls extending transversely of said block and about said camshaft, said walls having openings therein receiving said camshaft; manually releasable securing means in each of said walls; and a pair of spaced tubular members extending longitudinally of said block and parallel to said camshaft and spaced therefrom, said tubular members being secured in said walls by said manually releasable securing means and having a plurality of transverse openings formed therethrough for receiving and guiding said valve lifters.

3. In an internal combustion engine having a camshaft and cylinders and pistons and valve means including valve lifters, an engine block including: means for mounting said camshaft on a longitudinal axis therein adjacent said cylinders; a plurality of walls extending transversely of said block and about said camshaft, said walls having openings therein receiving said camshaft; manually releasable securing means in each of said walls; and a tubular member extending longitudinally of said block on an axis substantially parallel to and spaced from said longitudinal axis of said camshaft, said tubular member being secured in said walls by said manually releasable securing means and having a plurality of transverse openings formed therethrough for receiving and guiding said valve lifters.

4. In an internal combustion engine having a camshaft and cylinders and pistons and valve means including valve lifters, an engine block including: means for mounting said camshaft on a longitudinal axis therein adjacent said cylinders; a plurality of walls extending transversely of said block and about said camshaft, said walls having openings therein receiving said camshaft; manually releasable securing means in each of said walls; and a pair of spaced tubular members extending longitudinally of said block on axes substantially parallel to and spaced from said longitudinal axis of said camshaft, said tubular members being secured in said walls by said manually releasable securing means and having a plurality of transverse openings formed therethrough for receiving and guiding said valve lifters.

5. In an internal combustion engine having a camshaft, cylinders and pistons, valve means including valve lifters, and an engine block with lubrication passages therein: means for mounting said camshaft longitudinally thereof and adjacent said cylinders; a plurality of walls extending transversely of said block and about said camshaft, said walls having openings therein receiving said camshaft; manually releasable securing means in each of said walls; and a tubular member extending longitudinally of said block and parallel to said camshaft and spaced therefrom, said tubular member being secured in said walls by said manually releasable securing means and having a plurality of transverse openings formed therethrough for receiving and guiding the valve lifters and additional lubrication passages formed therein in fluid communication with said lubrication passages in said engine block.

References Cited in the file of this patent

UNITED STATES PATENTS

1,234,878	Corvin	July 31, 1917
1,969,690	Church	Aug. 7, 1934
2,070,806	Read	Feb. 16, 1937
2,781,750	Chayne	Feb. 19, 1957
2,793,625	Kolbe	May 28, 1957
2,893,358	Bauer	July 7, 1959