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2,641,235

ENGINE ROCKER ARM MECHANISM

Filed March 22, 1948

2 Sheets-Sheet 1

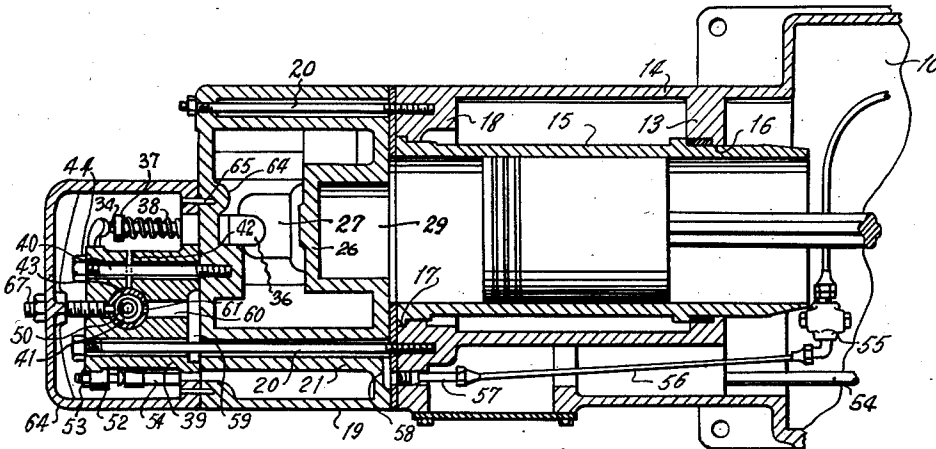


Fig. 1

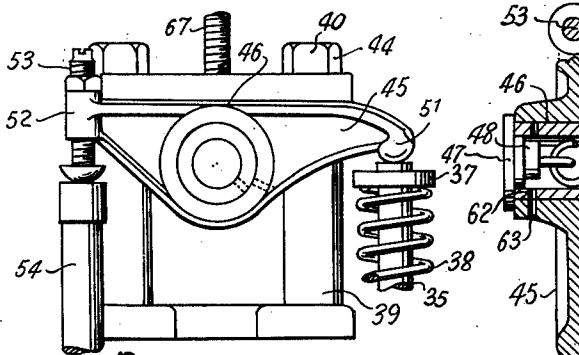


Fig. 2

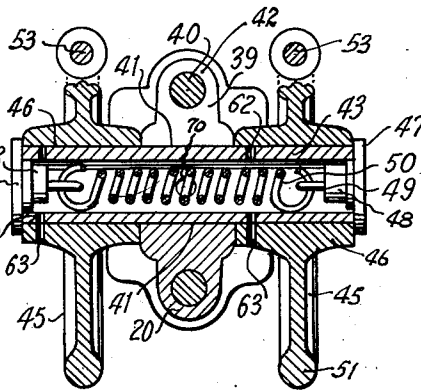


Fig. 3

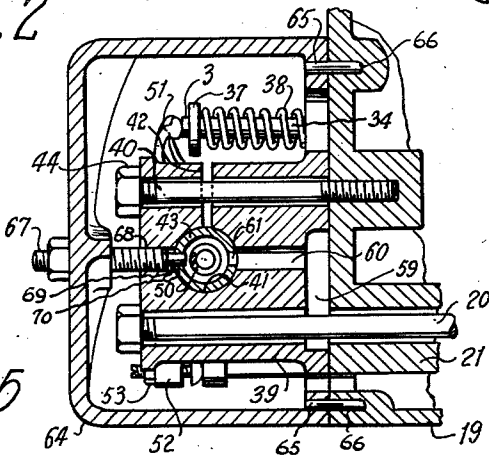


Fig. 5

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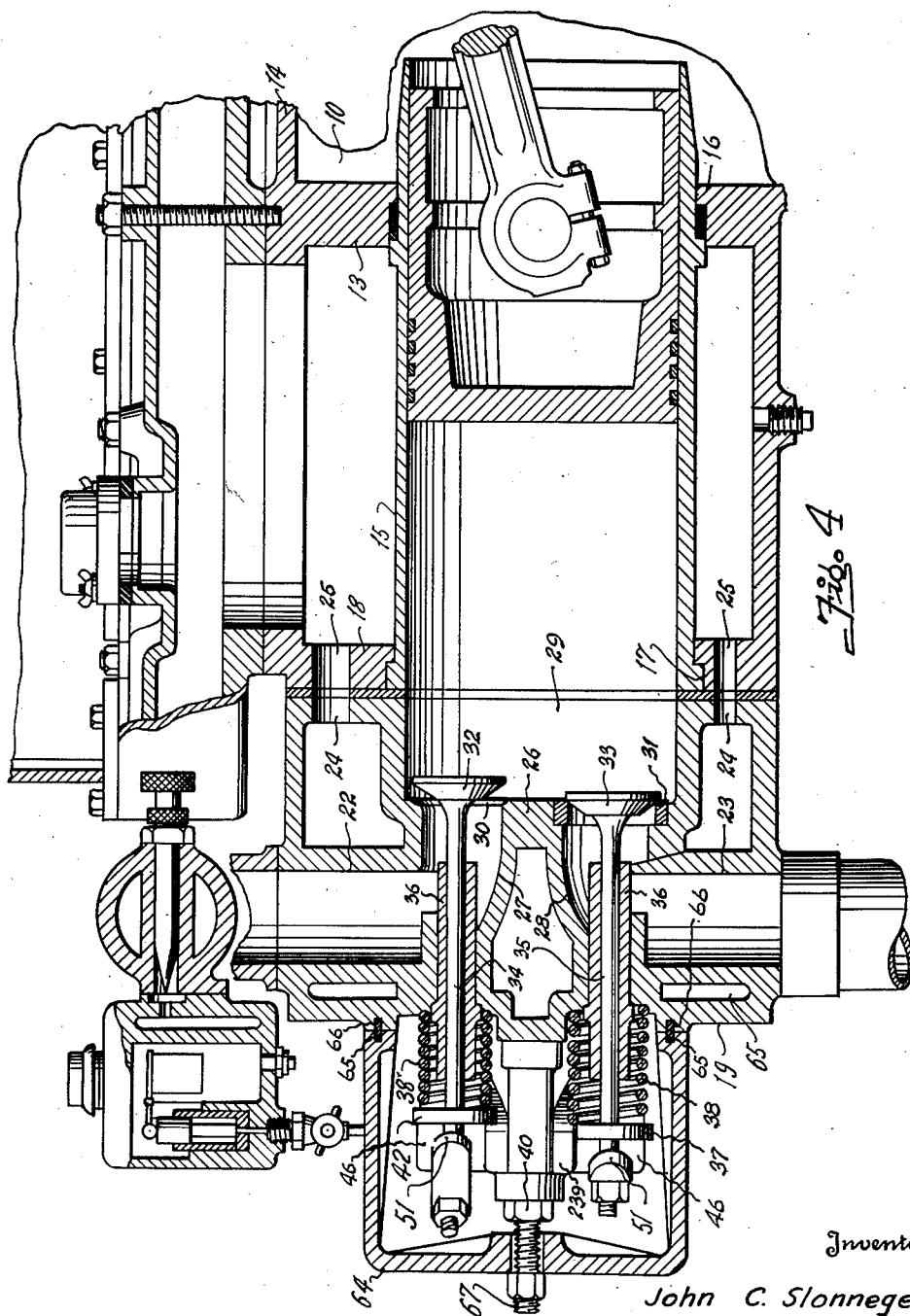
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ENGINE ROCKER ARM MECHANISM

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Original application March 14, 1946, Serial No. 654,427, now Patent No. 2,590,134, dated March 25, 1952. Divided and this application March 22, 1948, Serial No. 16,183

8 Claims. (Cl. 123—90)

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This invention relates to new and useful improvements in engine rocker arm mechanisms.

One object of the invention is to provide an improved rocker arm mechanism for internal combustion engines which includes a stationary shaft having rocker arms journaled thereon and resiliently retained members at the ends of the shafts confining the arms on the shaft, whereby said arms may be readily removed and replaced and binding of the arms of the shaft is obviated.

Another object of the invention is to provide a device of the character described wherein the rocker shaft is tubular so as to serve as an oil reservoir and has plugs in its ends connected by a coiled spring and provided with flanges for holding the arms on the shaft, whereby said plugs may readily be disconnected for removing and replacing the arms or for cleaning out the reservoir or its ports.

A further object of the invention is to provide the shaft and rocker arms with periodically registering ports and means for supplying oil to the reservoir under pressure, whereby fine streams of oil are intermittently ejected onto the valve stems.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, wherein examples of the invention are shown, and wherein:

Fig. 1 is a partial, horizontal, cross-sectional view of an internal combustion engine having a rocker arm mechanism constructed in accordance with this invention,

Fig. 2 is a side elevational view of the rocker arm mechanism,

Fig. 3 is a horizontal cross-sectional view of the same,

Fig. 4 is a longitudinal, vertical, sectional view of the portion of the engine shown in Fig. 1, and

Fig. 5 is an enlarged sectional view of the mechanism.

This application is a division of my co-pending application filed March 14, 1946, Serial No. 654,427, now matured into Patent Number 2,590,134, issued March 25, 1952.

In the drawings, the numeral 10 designates the crankcase of a single cylinder, horizontal type of internal engine which has mounted therein in a suitable manner a crankshaft (not shown) and a camshaft (not shown). The inner end of the crankcase is formed with a transverse

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web 13 and a cooling jacket 14 extends therefrom. A cylinder 15 has its inner end packed in an opening 16 in the web and is provided at its outer or head-end with an external annular flange 17 seated in an internal, annular abutment 18 at the head-end of the jacket.

The engine being of the valve-in-head type, a cylinder head 19 is secured to the abutment by long bolts 20. The head is generally hollow, the bolts extending through sleeves 21. The head is cast with an intake duct 22 in its upper portion and with an exhaust duct 23 in its lower portion, said ducts being spaced from the outer walls of the head so as to provide a coolant circulating space therearound. The head space communicates with the jacket 14 through ports 24 registering with ports 25 in the abutment 18. The inner ends of the ducts are made integral with a valve block, indicated generally by the numeral 26, and merged into elbows 27 and 28, respectively, directed toward the cylinder 15.

The ducts open into a head chamber 29 formed integral with the head block and open to the cylinder. Annular valve seats 30 and 31, respectively, are formed around the inner ends of the ducts, the seat 30 receiving an inlet valve head 32 and the seat 31 receiving an exhaust-valve head 33. The valve head 32 has a stem 34, while the exhaust-valve head 33 has a stem 35. These stems are slidable in horizontal bushings 36 mounted in the block. Collars 37 are secured on the stems adjacent their outer ends and coil springs 38, surrounding the stems, are confined between the collars and the head block 19.

A rocker bracket 39 is mounted on the outer face of the head block by means of a stud bolt 40 and the bolt 20, as shown in Fig. 1. This bracket, near its outer end, is formed with a transverse bore 41 and is split radially, at 42, from said bore outwardly so that a tubular rocker shaft 43, may be clamped therein when the nut 44 is tightened on the bolt 40. The medial portion of the shaft is received by the bracket so that said shaft extends on each side thereof.

Rocker arms 45 have hubs 46 at their medial portions, said hubs being journaled on the shaft 43 with their inner ends bearing against the sides of the bracket. The hubs are confined on the shaft by cap plugs 47 having stepped bosses 48 engaging in the ends of the rocker shaft. Each boss has an eye 49 and the ends of a coiled spring 50 positioned in the shaft, are hooked into these eyes. The spring, being under tension, is sufficiently strong to hold the hubs on the shaft.

This plug arrangement of confining the rocker

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arms on the shaft is simple and has certain advantages. Since the plug is held in place by the end of the shaft, the hub 46 may be given just enough clearance to rock freely and thus, a mechanic cannot bind the hub on the shaft which occurs where screw-threaded retainers are used. By pulling a plug outwardly and unhooking the spring 50 a rocker arm may be quickly removed and replaced.

Each rocker arm has a hemispherical boss 51 on one end, overhanging and bearing on the upper end of one of the valve stems. At the opposite end of each rocker arm the usual tappet sleeve 52 and tappet pin 53 are carried. The tappet pins are raised by the push rods 54 which, in turn, are reciprocated by the camshaft as is common in this art.

One of the features of the invention is the means of lubrication. As shown in Fig. 1, an oil line fixture 55 is provided in the crankcase and connected with the oil pressure supply means (not shown). An oil feed pipe 56 extends from this fixture and connects with a nipple 57 mounted in the abutment 18. A duct 58 in the inner face of the head block 19 (Fig. 1) connects the nipple with the bore of one of the sleeves 21.

It is pointed out that the space surrounding the sleeve 21 is filled with the coolant employed in the engine. Due to the relatively high operating temperature common to this type of engine, the coolant is normally near its boiling point and will maintain the sleeve in a considerably warmed condition. Thus, the sleeve functions as a heat exchanger to pre-heat the oil passing to the rocker arms and insure proper circulation and lubrication by said oil.

The base of the bracket 39 has a duct 59 extending from the outer end of the bore of said sleeve to a passage 60 extending to the bore 41. A reduced port 61 in the shaft 43 admits oil from the passage into said shaft.

Since the oil is under pressure, it will be seen that the shaft is filled with oil under pressure. The plugs 47 coast with the tubular shaft 43 in providing an oil reservoir; however the use of the term "oil reservoir" herein is not intended to limit the invention to the use of said plugs, since the ends of the shaft may be closed in any suitable manner.

Near its left-hand end (Fig. 3) the shaft 43 is provided with ports 62, at least one of which is located to register with a port 63 in the hub 46 of the adjacent rocker arm, during a portion of the oscillation of said arm. The oil, being under pressure in the shaft, will be periodically ejected from the same through the port 63. This port is small so as to eject a needle-like stream or jet. The port 63 is bored so as to direct its oil stream onto the valve stem of one of the valves.

A second set of ports 62 and 63 are provided in the opposite portion of the bracket 39 for the hub 46 of the other rocker arm and are used to eject an oil stream onto the stem of the other valve. In this manner, the valve stems are efficiently lubricated. Some of the oil from a shaft 43 escapes through the ports 62 and lubricates the hubs 46 of the rocker arms 45. It is pointed out that when either the head block 19 or the bracket 39 is removed there are no oil line connections to be disconnected or replaced when the parts are reassembled. This feature is due to the use of the ducts 58 and 59 and precludes disrupting of the oil lines by a mechanic making repairs.

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A cover 64 is fastened on the head block 19 to house the bracket 39 and rocker arms 45. The cover has pilot pins 65 which engage in sumps 66 in the outer face of the block 19. A single bolt 67 is used to fasten the cap in place. This bolt is screwed into a screw-threaded bore 68 in the bracket 39 and the shaft 43 is exposed at the inner end of this bore. The screw has a reduced stud 69 at its inner end. When the shaft 43 is fastened in the bracket, a hole 70 therein is registered with the bore 68 so as to receive the stud 69. By this means, rotation of the shaft is prevented in case the shaft becomes loose, and proper positioning of the ports 62 is assured.

The oil which is discharged in various manners into the cover 64 may return by gravity to the crankcase along the exterior of the push rods 54 or by any other suitable route. Thus, an accumulation of oil in the cover is prevented, and the push rods work in a constant bath of oil.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. In combination, an engine head block, having valve seats, valves engaging said seats having stems, a rocker shaft having an oil space, and rocker arms on the shaft each having oil jet means located to direct a stream of oil onto one of the valve stems, the oil space of the shaft having outlets periodically registering with the jet means.

2. In combination, an engine head block, having valve seats, valves engaging said seats having stems, a rocker shaft having an oil space, rocker arms on the shaft each having oil jet means located to direct a stream of oil onto one of the valve stems, the oil space of the shaft having outlets periodically registering with the jet means and oil pressure supply means connected with the oil space of the shaft.

3. In combination, an engine head block, having valve seats, valves engaging said seats having stems, a rocker shaft having an oil reservoir therein, a bracket carrying the shaft and having an oil pressure supply passage connected with reservoir of the shaft, and rocker arms journaled on the shaft, the shaft having oil outlets to the arms, said arms having jet means periodically registering with the oil outlet means of the shaft located to direct oil streams onto the valve stems.

4. In combination, an engine head block, having valve seats, valves engaging said seats having stems, a bracket secured to the head block between the valve stems, a rocker shaft having its medial portion secured in the bracket and having an oil reservoir, the shaft having oil outlet ports on each side of the bracket, and rocker arms having hubs journaled on the shaft on each side of the bracket, each hub having a restricted opening directed toward one of the valve stems and periodically registering with one of the shaft outlet ports, the bracket having an oil pressure supply passage connected with the reservoir of the shaft.

5. The combination with a rocker shaft having an internal oil passage and a port leading from the passage to the surface of the shaft, of a rocker arm journaled on the shaft, said rocker arm having a bore receiving the shaft and an oil passage leading from the bore to an external portion

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of the rocker arm, the rocker arm oil passage and the shaft port being restricted so as to be intermittently in and out of register as the rocker arm oscillates on the shaft.

6. The combination with a rocker shaft having an internal oil passage and a port leading from the passage to the surface of the shaft, of a rocker arm journaled on the shaft, said rocker arm having a bore receiving the shaft and an oil passage leading from the bore to an external portion of the rocker arm, the rocker arm oil passage and the shaft port being of limited cross-sectional area at least at the engaging surfaces of the rocker shaft and the rocker arm bore whereby as the rocker arm oscillates upon the rocker shaft the rocker arm oil passage is intermittently moved into and out of communication with the shaft port.

7. The combination with a rocker shaft having an internal oil passage and a port leading from the passage to the surface of the shaft, of a rocker arm having a bore receiving the shaft and overlying the shaft port, the rocker arm being adapted to oscillate upon the rocker shaft through an arc of predetermined magnitude, said rocker arm having an oil passage leading from the bore to an external portion of the rocker arm, the port being so positioned upon the shaft and the rocker arm oil passage being so positioned with respect to the rocker arm bore as to place the port and the latter passage in communica-

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tion during a portion only of the arc of oscillation of the rocker arm on the shaft.

8. The combination with a rocker shaft having an internal oil passage and a port leading from the passage to the surface of the shaft, of a rocker arm having a bore receiving the shaft and overlying the shaft port, the rocker arm being adapted to oscillate upon the rocker shaft through an arc of predetermined magnitude, said rocker arm having an oil passage leading from the bore to an external portion of the rocker arm, the latter passage having an inlet in the wall of the bore, said inlet being so positioned circumferentially of the bore as to overlie the shaft port during a portion only of the arc of oscillation of the rocker arm on the shaft.

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