Nov. 14, 1961 S. KRIZMAN 3,008,544

LUBRICATING SYSTEM

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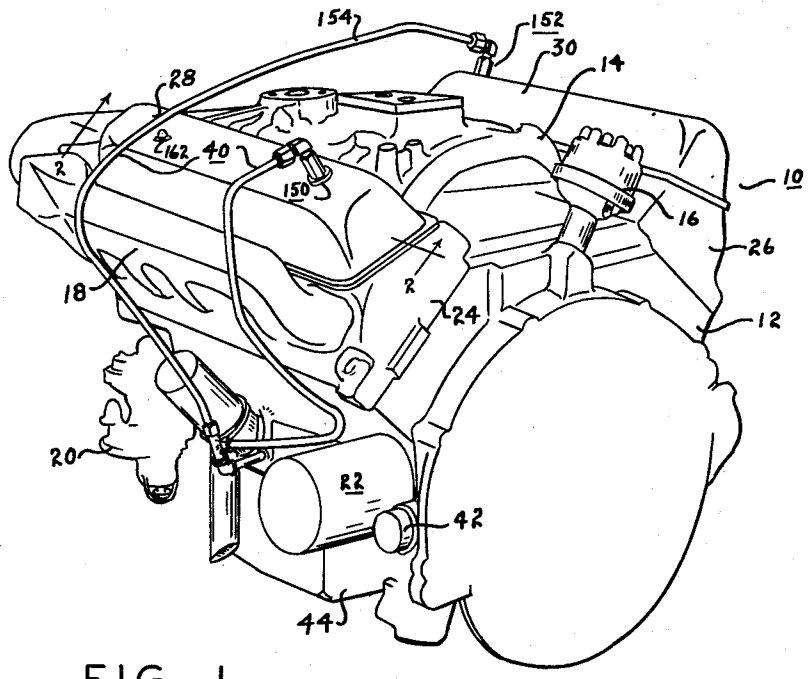


FIG. 1

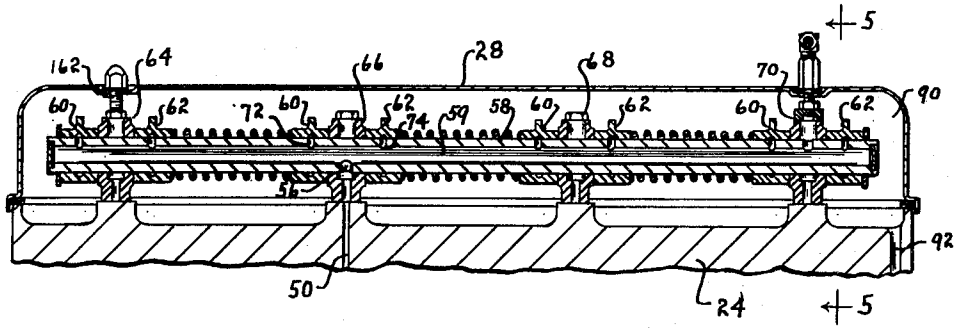


FIG. 2

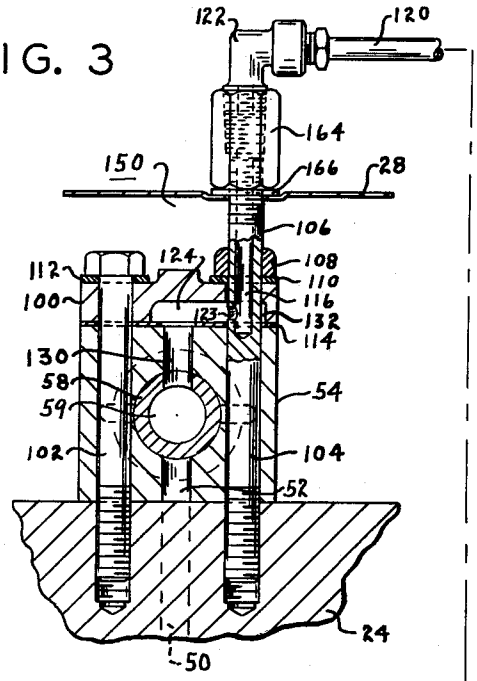
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FIG. 3



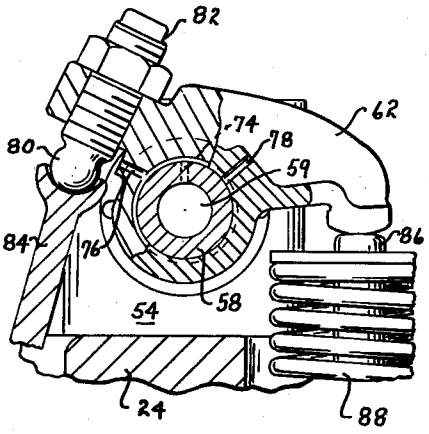


FIG. 5

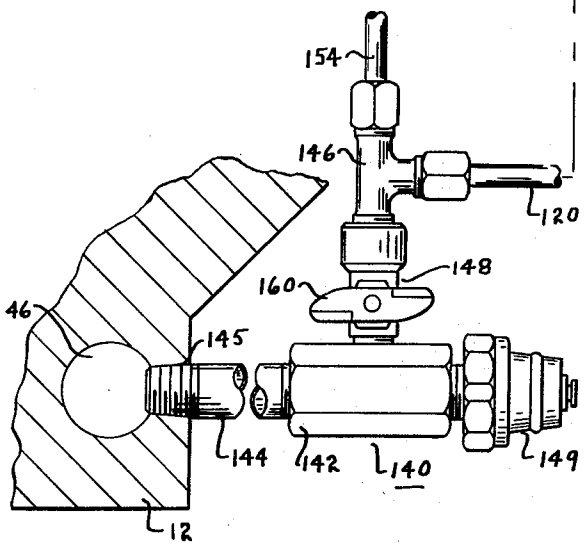


FIG. 4

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LUBRICATING SYSTEM

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The present invention relates to a lubricating system for internal combustion engines, and more particularly to a lubricating system for the rocker arm assemblies of internal combustion engines having overhead valves.

In conventional internal combustion engines for automobiles and trucks, the lubricating system includes a series of long, circuitously arranged oil passages of small diameter extending from the oil pump through the engine block and cylinder head into supports and shafts for the rocker arms. The oil underpressure passes upwardly through these passages and rocker arm shaft, and is discharged through ports into the rocker arm bearings, and thence onto the bearing connections between the rocker arm and push rod on one side and valve stem on the other side. An oil outlet conduit is usually provided for circulating excess oil through the rocker arm shaft back to the oil pan. The moving parts of the rocker arm assemblies are thoroughly and constantly lubricated by the foregoing conventional system as long as this system is functioning properly; however, during the operation of the engine over a period of time, sludge accumulates in the lubricating system, and/or the cam bearings in the block through which the oil passes before reaching the cylinder head become turned, thereby blocking or seriously restricting the flow of oil to the rocker arms. Consequently, the rocker arms and associated parts receiving their lubrication through the rocker arm assemblies become noisy and operate inefficiently or become completely inoperable and often corroded from moisture condensation, requiring expensive overhauling of the engine and replacement of a number of parts of the rocker arm assemblies. In view of the difficulty and expense of unblocking and cleaning the lubricating system, often requiring a major overhauling operation in itself, the system is often neglected until irreparable damage has been done to the rocker arm assemblies. It is therefore one of the principal objects of the present invention to provide an auxiliary lubricating system for supplementing, or in effect replacing, the conventional lubricating system for the rocker arm assemblies, which can be installed on the engine with a minimum amount of labor and with only a relatively few simple replacement parts, and which will effectively lubricate the assemblies using the original passages and ports through the rocker arm shaft and rocker arms.

Another object of the invention is to provide a lubricating system for the rocker arm assemblies of an internal combustion engine which can be readily substituted for the original system and which can be installed on the engine without drilling or machining the original engine parts, or otherwise making any substantial change in the engine structure.

Still another object of the invention is to provide a device for supplying lubricating oil to the rocker arm assemblies of an engine in which the flow of oil is reversed and the long circuitous passages in the engine block leading to the assemblies eliminated from the lubricating system, and which includes only quickly assembled and installed parts.

A further object is to provide a rocker arm lubricating system which can be readily serviced, inspected and cleaned by merely disconnecting its easily reached, exposed oil supply tubes and removing the rocker arm

cover, without the use of any special tools and equipment or appreciable loss of time for making the installation.

Another object of the invention is to provide a lubricating system for the rocker arm assemblies of an engine, having means therein for adjusting the flow of oil therethrough to obtain the desired flow through the system and to balance the flow to the various rocker arm assemblies in order to adequately lubricate all the assemblies without providing an excessive amount to any one assembly or group of assemblies.

Additional objects and advantages of the invention will become apparent from the following description and accompanying drawings wherein:

FIGURE 1 is a perspective view of an internal combusion engine having my rocker arm lubricating system installed thereon;

FIGURE 2 is a fragmentary cross sectional view of the engine shown in FIGURE 1, taken on line 2—2 of the latter figure and showing the upper portion of a cylinder head and the rocker arm assemblies mounted thereon;

FIGURE 3 is a vertical cross sectional view through a rocker arm support showing parts of the present lubricating system installed thereon;

FIGURE 4 is an elevational view of the oil galley assembly forming a part of the present rocker arm lubricating system, showing said assembly connected to an oil passage in the engine block, the latter being shown in cross section; and

FIGURE 5 is a vertical cross sectional view of a rocker arm assembly taken on line 5—5 of FIGURE 2.

Referring more specifically to the drawings and to FIGURE 1 in particular, numeral 10 designates an internal combustion engine of the V-8 type, the particular one shown being a Ford engine used in the 1959 model, said engine briefly consisting of a block 12, intake manifold 14, distributor 16, exhaust manifold 18, fuel pump 20, oil filter 22, cylinder heads 24 and 26, and rocker arm covers 28 and 30 secured to cylinder heads 24 and 26, respectively. The present lubricating system has been installed on the engine shown in FIGURE 1 and is designated by the numeral 40 with lead lines directed to certain exposed portions of the system. The foregoing engine has been shown merely for the purpose of illustrating the present invention, which is adapted or can be readily adapted to various other makes of internal combustion engines.

Since the internal combustion engine on which the present lubricating system has been installed is conventional, the details of the engine not shown in FIGURE 1 will not be described herein, with the exception of mentioning that the oil pump designated numeral 42 draws oil from the oil pan 44 secured to the bottom of the block, and delivers the oil through filter 22 and thence through a system of passages in the engine block, one of which is shown at numeral 46 in FIGURE 4. The passages in the block are connected with a passage 50 in each cylinder head, which in turn is connected to the rocker arm assemblies as shown in FIGURE 2 of the drawings. Since the valve assemblies for each bank of the V-8 engine are the same, only the one shown mounted on cylinder head 24 will be described in detail.

In the conventional engine, oil passes from passage 50 into passage 52 of the rocker arm support 54, through a port 56 of rocker arm shaft 58 into passage 59 thereof, from which it is discharged into the bearings of the rocker arms 60 and 62 of each rocker arm assembly 64, 66, 68 and 70, the oil passing from the internal passage 59 of shaft 58 through ports 72 and 74, to the bearings of rocker arms 60 and 62, respectively. The oil then passes from the rocker arm bearings through two passages 76

and 78, the former discharging onto the connecting bearing 80 between the adjustment screw 82 of the rocker arm and push rod 84, and the latter passage discharging onto the connection between the upper end of valve stem 86 and the respective end of the rocker arm, the stem being urged into engagement with the rocker arm by spring 88. The oil discharged through passages 76 and 78 flows through the lower portion of the rocker arm chamber 90 and returns to the oil pan through drain passage 92 extending downwardly through the cylinder head and engine block. An oil outlet tube (not shown) is normally provided on one of the rocker arm assemblies, for example on the one indicated by numeral 70, in order to permit the excess oil to circulate through the lubricating system and be returned promptly to the oil pan 44.

Since, as is shown in FIGURE 2, passage 50 is relatively small and passes upwardly through the cylinder block and cylinder head through a relatively long circuitous route, it occasionally becomes blocked or severely restricted by an accumulation of sludge therein or by disalignment of passage sections in the engine block. When this takes place, oil to the rocker arm assemblies 64, 66, 68 and 70 is completely cut off or severely restricted so that excessive wear occurs and the rocker arm parts become noisy and inefficient or fail entirely to operate. In order to unblock the passages leading to and through the cylinder head, it is necessary to disassemble the engine and locate the blocked area in order to remove the foreign matter and/or realign the parts of the passage so that the oil will again flow properly through the passages, thus performing a major and expensive overhauling operation.

The present invention overcomes this difficulty of inadequate lubrication without the necessity of the overhauling operation, and is so constructed and arranged that it can be readily installed on the engine without the use of any special tools or skilled mechanics. The present lubricating device consists of a special spacer 100 secured to the upper end of support 54 by bolt 102 and stud 104 extending downwardly through spacer 100 and support 54 into threaded holes in cylinder head 24. Stud 104 is the same as bolt 102 in the portion extending downwardly through support 54 into head 24, but has an extension 106 formed integrally therewith and projecting upwardly through cover 28. The entire upper end of stud 104 is threaded and receives a nut 108 which is threaded downwardly thereon until it seats firmly against the gasket 110 and spacer 100. When nut 108 is tightened downwardly against gasket 110 and bolt 102 is tightened into head 24 against gasket 112, spacer 100 is seated in a fluid-tight relationship on a gasket 114, which in turn is pressed firmly against the upper side of support 54. Extension 106 of stud 104 has a longitudinally extending passage 116 communicating at its upper end with a tube 120 through fixture 122, and communicating at its lower end through port 123 with a passage 124 in the lower side of spacer 100. Passage 124 communicates with passage 130 and therethrough with the passage in rocker arm shaft 58, passage 124 being somewhat larger than stud 104, as shown at numeral 132, so that, when the stud is tightened in place, port 123 may be in any circumferential position and still effectively connect passage 116 with passage 130. In the conventional lubricating system, passage 130 is connected with the overflow outlet and the excess oil delivered to the rocker arm shaft flows upwardly through passage 130 and thence through an outlet tube (not shown). In the present system this flow of oil is reversed, the oil supplied through conduit 120 passing downwardly through passage 116 of extension 106 and passage 124 into passage 130 and thence to the interior of rocker arm shaft 58. The oil after entering the passage in rocker arm shaft 58 flows to the rocker arm bearings, the connection bearing 80 between push rod 84 and adjustment screw 82, and valve stem 86 and the adjacent portion of the rocker arm, in the same manner as in the conventional system. Since the flow through passage 50 has been

blocked, the entire source of lubrication for the rocker arm assemblies is supplied through tube 120.

Tube 120 is connected to the main supply line of the original lubricating system through the oil galley assembly 140 consisting of an L-shaped adapter 142 connected at one end to oil passage 46 by a pipe 144 threadedly received in a threaded hole 145, originally provided in the block and normally closed by a plug or oil pressure gauge, and connected on one side to a T-connection 146 by a valve 148. The original oil pressure gauge 149 is preferably installed on the galley assembly on the end of adapter 142 opposite pipe 144. The oil pressure and flow in the present auxiliary or substitute system can be conveniently controlled by adjusting valve 148 by the use of thumb screw 160. Connection 146 is connected to rocker arm assembly lubricator 150 by tube 120 and to rocker arm assembly lubricator 152 by a tube 154. Since lubricators 150 and 152 are identical in construction and operation only lubricator 150 has been described in detail herein.

After spacer 100 has been secured in place by bolt 102, stud 104 and nut 108, cover 28 is assembled and placed on the cylinder head with projection 106 extending upwardly through the hole normally provided for one of two original bolts 162 (shown in FIGURES 1 and 2) and a nut 164 is threadedly tightened onto projection 106, pressing washer 166 firmly against the adjacent portion of cover 28 and together with bolt 162, firmly securing cover 28 in fluid-tight position on head 24. It is thus seen that with the foregoing construction, both the connection of galley assembly 140 and lubricators 150 and 152 are made using holes and/or threads originally provided in the engine block, cover, head and rocker arm supports, thus permitting the present device to be readily installed on an engine in the field without any drilling or machining operations.

In the operation of the present rocker arm lubricating system, after the engine has been started, oil pumped into passage 46 in block 12 passes therefrom through pipe 144, adapter 142, valve 148, connection 146, and thence through branch tubes 120 and 154 to lubricators 150 and 152, respectively. The oil passes from the respective tubes 120 and 154 downwardly through passage 116 in extension 106 into passage 124, and thence downwardly through passage 130 into passage 59 in rocker arm shaft 58, from which it flows through the various ports previously described to lubricate the rocker arm and connecting elements. While only one embodiment of the present invention has been described in detail herein, various changes and modifications may be made in the present lubricating system and the parts thereof without departing from the scope of the present invention.

I claim:

1. A lubricating system for the rocker assemblies of an internal combustion engine having two hollow rocker arm shafts, supports therefor, each with two vertical holes therethrough for receiving bolts for mounting said support on the engine and with a downwardly extending oil passage therein for delivering oil to the hollow interior of the respective shaft, and covers for said assemblies, said system comprising a lubricating unit for the supports of each rocker arm shaft, each unit including a spacer on said support having two holes corresponding to the holes in said support and a passage communicating at one end with the passage in said support and at the other end with one of the holes in said spacer, a bolt extending downwardly through the other hole in said spacer and support for securing said spacer onto said support and said support onto the engine, a stud extending downwardly through said one hole and through the spacer for securing said spacer onto said support and said support onto the engine and projecting upwardly through said cover, a nut threaded onto said stud for retaining said spacer on said support, a second nut on said stud for holding the cover in place over the assemblies, said stud having a longitudinal passage therein extend-

ing from the upper end and communicating with the passage in said spacer, a galley assembly having an inlet conduit for communicating with an oil pressure conduit in the engine and an outlet conduit, a valve in said outlet conduit, and tubular conduits connecting said outlet conduit with the passage in the stud of each unit.

2. A lubricating system for the rocker assemblies of an internal combustion engine having a hollow rocker arm shaft, a support therefor with two vertical holes therethrough for receiving bolts for mounting said support on the engine and with a downwardly extending oil passage therein for delivering oil to the hollow interior of said shaft, and a cover for said assemblies, said system comprising a spacer on said support having two holes corresponding to the holes in said support and a passage communicating at one end with the passage in said support and at the other end with one of the holes in said spacer, a bolt extending downwardly through the other hole in said spacer and support for securing said spacer onto said support and said support onto the engine, a stud extending downwardly through said one hole and through the spacer for securing said spacer onto said support and said support onto the engine and projecting upwardly through said cover, a nut threaded onto said stud for retaining said spacer on said support, a second nut on said stud for holding the cover in place over the assemblies, said stud having a longitudinal passage therein extending from the upper end and communicating with the passage in said spacer, a galley assembly having an inlet conduit for communicating with an oil pressure conduit in the engine and an outlet conduit, a valve in said outlet conduit, and a tubular conduit connecting said outlet conduit with the passage in said stud.

3. A lubricating device for the rocker assemblies of an internal combustion engine having a hollow rocker arm shaft, a support therefor with two vertical holes therethrough for receiving bolts for mounting said support on the engine and with a downwardly extending oil passage therein for delivering oil to said shaft, and a cover for said assemblies, said device comprising a spacer on said support having two holes corresponding to the holes in said support and a passage communicating at one end with the passage in said support and at the other end with one of the holes in said spacer, a bolt extending downwardly through the other hole in said spacer and suport for securing said spacer onto said support, a stud extending downwardly through said one hole and through the spacer for securing said spacer onto said support and projecting upwardly through said cover, a means on said stud for retaining said spacer on said support, a nut on said stud for holding the cover in place over the assemblies, said stud having a longitudinal passage therein extending from the upper end and communicating with the passage in said spacer, a means having an inlet conduit for communicating with an oil pressure conduit in the engine and an outlet conduit, and a tubular conduit connecting said outlet conduit with the passage in said stud.

4. A lubricating device for the rocker assemblies of an internal combustion engine having a rocker arm shaft, a support therefor with a hole therethrough and a downwardly extending oil passage therein for delivering oil to said shaft, and a cover for said assemblies, said device comprising a spacer on said support having a hole corresponding to the hole in said support and a passage communicating with the passage in said support, a stud extending downwardly through the hole in said spacer into

the support for securing said spacer onto said support and projecting upwardly through said cover, a means on said stud for retaining said spacer on said support, a nut on said stud for holding the cover in place over the assemblies, said stud having a longitudinal passage therein extending from the upper end and communicating with the passage in said spacer, a means having an inlet conduit for commmunicating with an oil pressure conduit in the engine, and an outlet conduit connecting said means with the passage in said stud.

5. A lubricating device for the rocker assemblies of an internal combustion engine having a rocker arm shaft and a support therefor with a hole therein and a downwardly extending oil passage therein for delivering oil to said shaft, said device comprising a spacer on said support having a hole corresponding to the hole in said support and a passage communicating with the passage in said support, a stud extending downwardly through the hole in said spacer for securing said spacer onto said support, a means on said stud for retaining said spacer on said support, said stud having a longitudinal passage therein extending from the upper end and communicating with the passage in said spacer, a means having an inlet conduit for communicating with an oil pressure conduit in the engine, and an outlet conduit connecting said means with the passage in said stud.

6. In a system for the rocker assemblies of an internal combustion engine having a hollow rocker arm shaft, a support therefor with vertical holes therethrough for receiving bolts for mounting said support on the engine and with a downwardly extending oil passage therein for delivering oil to said shaft and a cover for said assemblies: a spacer on said support having holes corresponding to the holes in said support and a passage communicating at one end with the passage in said support and at the other end with one of the holes in said spacer, a bolt extending downwardly through the other hole in said spacer and support for securing said spacer onto said support, a stud extending downwardly through said one hole for securing said spacer onto said support and projecting upwardly through said cover, a nut threaded onto said stud for retaining said spacer on said support, a second nut on said stud for holding the cover in place over the assemblies, said stud having a longitudinal passage therein extending downwardly and communicating with the passage in said spacer, and means for supplying oil to the passage in said stud.

7. In a lubricating device for the rocker assemblies of an internal combustion engine having a rocker arm shaft and a support therefor with a hole therein and an oil passage therein for delivering oil to said shaft: a spacer on said support having a hole corresponding to the hole in said support and a passage communicating with the passage in said support, a stud extending through the hole in said spacer and into the support for securing said spacer onto said support, a means on said stud for retaining said spacer on said support, said stud having a longitudinal passage therein extending from the upper end and communicating with the passage in said spacer, and a means for supplying oil to the passage in said stud.

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