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SYSTEM FOR SUPPLYING OIL TO INTERNAL COMBUSTION ENGINES

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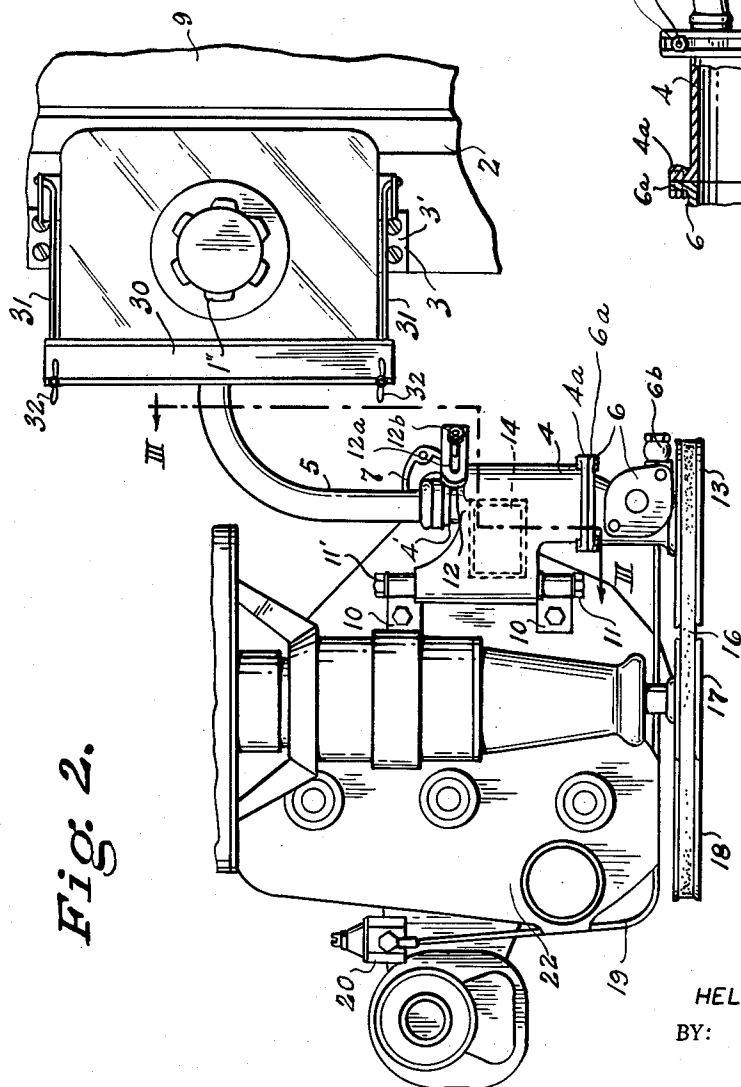


Fig. 2.

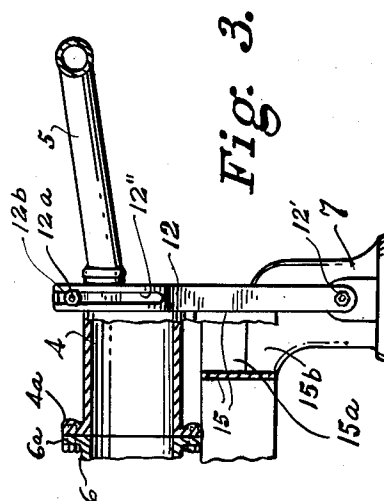


Fig. 3.

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1

3,137,285

SYSTEM FOR SUPPLYING OIL TO INTERNAL COMBUSTION ENGINES

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My present invention relates to a system for supplying oil to internal-combustion engines and, more particularly, to apparatus for metering, in predetermined quantities, a lubricant to the carburetor or fuel injector of an internal-combustion engine for admixture of the lubricant to the fuel prior to introduction into the combustion cylinders.

Heretofore, internal combustion engines and especially so-called "two-cycle" or "two-stroke" devices have been provided with the pumps or the like for metering a predetermined proportion of lubricant to the fuel-injecting means of the engine. In the fuel-injecting means, the oil is admixed with a fuel (e.g. gasoline) and dispersed in a gas stream or gasified for introduction into the engine cylinder, wherein it is compressed and ignited to provide motive power. For the most part, the oil-supply system included an oil reservoir mounted directly upon the engine block and communicating with the pump through a relatively large opening so that oil supply to the engine was insured even when the oil was in a highly viscous state, e.g. when starting in cold weather. Known systems of this type had several not inconsiderable disadvantages. Firstly, the vibrations of the engine block were directly applied to the entire oil reservoir and adversely affected the welded joints normally employed in assembling these reservoirs. This was particularly the case when the oil reservoir was designed to be used for both high- and low-power engines since it had to be dimensioned to withstand the vibrational stresses applied by the high-power engine even if it was to be used only with a low-power engine if high-production rates and interchangeability of parts was of importance.

Secondly, the oil reservoir must be composed of heat-resistant but nevertheless heat-conductive material so that some prewarming of the oil can be effected without deterioration of the walls of the reservoir.

Thirdly such known constructions are characterized by a variation in the quantity of oil supplied to the engine at constant pump displacement since the oil in the reservoir heats only slowly as a consequence of its large integral heat capacity so that the viscosity of the oil decreases progressively after starting over a relatively long operating period.

It is an object of the present invention to provide the oil-supply system for an internal-combustion engine wherein the aforementioned disadvantages are obviated and whose components are conducive to serial production and are interchangeable in engines of a wide range of power output.

Another object of this invention is to provide an oil-supply system of the character described wherein oil of a substantially constant viscosity is supplied to the engine during operation to ensure proper metering of this oil to the engine.

Still another object of my invention is to eliminate the need for measuring rods and the like for indicating the level of a lubricant in an oil system of this character and to avoid unnecessary thermal and vibrational stresses upon the oil reservoir thereof.

These objects are attained, in accordance with the invention, by providing a system for supplying a lubricant to an internal-combustion engine wherein the large-

2

capacity oil reservoir is mounted upon a support with respect to which the engine block can vibrate, an oil-displacing pump being provided on the block and in communication with a preheating chamber thereon, whose capacity is a small fraction of that of the reservoir to which it is coupled by suitable conduit means designed so as not to impede substantially the flow of lubricant into the heating chamber even when the oil is in a highly viscous state. Advantageously, the conduit means flexibly interconnects the reservoir with the heating chamber so that transmission of vibrational stress from the latter to the former is not possible, the conduit means being of relatively large diameter to insure free flow of the lubricant in its most viscous operative state.

I have found that best results are obtained when the housing means constituting the heating chamber is composed of a metal having high thermal conductivity (e.g. aluminum or aluminum alloy) whereby engine heat is communicated without substantial loss to the oil within the heating chamber. The housing means can thus be produced by die casting a so-called light-metal alloy. The housing means is preferably flanged directly to the pump whose large-diameter intake bore registers with the preheating chamber, the diameter of which is approximately equal to that of the intake bore.

According to another feature of this invention, the preheating chamber is disposed adjacent the exhaust duct (e.g. manifold or elbow) so as to be heated by the latter. Furthermore, wall means may be provided at the manifold to form a heat shaft open in the direction of the heating chamber whose housing means is then provided with a concavity registered with this shaft. To make use of convection currents as well as radiant heat, the heating chamber is disposed above the exhaust duct, the heat shaft being substantially vertical.

Still another feature of the present invention resides in positioning the heating reservoir in such location that it is out of the path of thermal radiation or convection currents from the exhaust duct and can, therefore, be composed of a transparent or translucent material (e.g. a synthetic resin of, say, the polyacrylic type). This arrangement dispenses with any need for a dip stick or other oil-level indicator since the level of the oil can be readily determined by observing its location in the light-permeable reservoir. The preheating chamber can be adjustably mounted on the engine block together with the pump secured thereto in order to permit tightening of the drive belt passing around the pump pulley. The mounting means may include a pivot arrangement and a locking device for securing the heating chamber in a selected position. For convenience, the oil reservoir can be mounted upon the wheel housing of a vehicle body whose chassis also carried the engine. I have found that excellent results can be obtained with a system of this type when the outlet tube connecting the pressure side of the pump with the fuel gasifier is received, at least along the intermediate portion of its length, in one or more grooves provided in the engine block. If the tube is heat-conductive, this system reduces heating losses since the engine block is normally at a somewhat elevated temperature.

The above and other objects, features and advantages of the present invention become more readily apparent from the following description reference being made to the appended drawing in which:

FIG. 1 is a front elevational view, partly broken away, of an internal combustion engine provided with a fuel system according to the present invention;

FIG. 2 is a top plan view of the system; and

FIG. 3 is a side elevational view of the reservoir, partly in section, along the line III—III of FIG. 2.

The motor vehicle shown in the drawing comprises a

3

wheel housing 9 for the front or rear wheel constituting part of the vehicle body 2. A base 3 is bolted to the body via its flanges 3' and carries an oil reservoir 1 of light-permeable and preferably transparent synthetic resin through which the oil level 1' can be viewed. This reservoir is seated upon a cushion 3'' of resilient material and is provided with a filling cap 1'' which is removable to permit introduction of oil into the reservoir 1. The latter is held in place by a corner plate 30 engaged by a pair of tie rods 31 and butterfly nuts 32. The spigot 1a at the base of the reservoir has a relatively large aperture (on the order of, say 5 cm.) over which is sleeved a flexible hose 5, constituting a conduit means flexibly interconnecting the reservoir 1 with a preheating chamber 4. The flexible hose 5 can be composed of a rubber or rubberized fabric, capable of resisting chemical deterioration by the oil, and is fixed to the spigot 1a by a strap clamp 5' at one end of the hose. At the other end thereof the hose is forced over a corrugated spigot 4' of the preheating device. The latter comprises housing means 4 forming a generally cylindrical chamber 4'' into which the hose 5 opens and which registers with the intake opening of a pump 6 and is of substantially the same diameter as this opening.

Pump 6 is provided with a flange 6a by which it is bolted to the complementary flange 4a of heating device 4 with or without an intermediate seal. The oil pump 6 can be of any conventional positive-displacement type and has an outlet 6b via which oil is fed to the engine. The housing means 4 of the heating chamber is provided directly above the exhaust duct 7 and is formed with a downwardly open concavity 14 registering with a vertical heating shaft 15a formed by vertical wall means 15 above the exhaust duct 7. This shaft is open at its bottom 15b to admit air heated by conduct with the duct 7 and permits it to rise by convection into the cavity 14 of the heater housing 4 whence it escapes at the mouth 14b of this cavity. The housing means 4 is composed of a high-conductive metal so that heat transferred to it by radiation from the blackened and roughened manifold 7 therebelow is communicated directly to the lubricant within the heating chamber 4''. It should be noted that the housing means is also heated by convection as previously indicated and by conduction as a consequence of its mounting directly upon the engine.

The engine block 8 is provided with a support 8' upon which a pair of lugs 10 are bolted. Pintle bolts 11, 11', threadedly received in the housing 4, serve as pivots for this housing and the pump 6 flanged thereto. A strap-steel bar 12, secured by a nut 12' to the exhaust duct 7, is provided with an elongated slot 12'' in which a bolt 12a secured to the housing 4 can slide. A nut 12b constitutes locking means for securing the housing 4 in a selected position of adjustment about its pivot. The pump 6 is provided with a V-belt pulley 13 which is driven by the drive pulley 18 mounted upon the crank shaft of the engine 8. The belt 16 passes around pulleys 18 and 13 as well as around the fan pulley 17. It should be noted, however, that it is also possible merely to drive the pump directly from the crankshaft or to use any other suitable transmission. A tube 19, of high thermal conductivity (e.g. composed of copper) is connected to the outlet 6b of pump 6 and passes into the oil reservoir 20 of the mixing device 20' wherein the oil is admixed with the gasoline or other fuel and atomized for introduction into the engine via intake duct 20''. The atomizing device can be of any conventional carburetor type suitable for use in a two-stroke engine, it being desirable that the oil inlet should enter the fuel line as close to the mixing tube as possible. The cylinder block 8 just below the cylinder head 22 is provided with a groove 21, in which the tube 19 is received substantially at its midpoint for support thereof. Since the cylinder block is at an elevated temperature from operation of the engine, this arrangement conserves the heat of the oil in line 19. The groove, if desired,

4

can extend over a substantial portion of the length of tube 19 (e.g. about half) for this purpose.

When the engine is started, the initial revolutions of the crankshaft pulley 18 drives the pump 6 to force oil into the mixing tube and thence into the cylinder of the engine. The oil is, however, in a relatively viscous state, so that its free movement is somewhat retarded. When viscous, the oil is fed to the pump with the aid of starting vibrations of the cylinder block which facilitate the displacement of the oil from hose 5 and chamber 4'' to the intake side of the pump. After the first few revolutions of the engine, the exhaust duct 7 is heated and its heat communicated to the housing 4 in heat-absorbing relationship therewith. The relatively small volume of oil in the preheating chamber is rapidly brought to the desired temperature wherein its viscosity enables it to be readily displaced by pump 6. Since hose 5 has a large cross-section, oil freely flows by gravity from the reservoir 1, whose vented cap admits air thereto, to the heating chamber.

The invention as described and illustrated is believed to admit of many modifications within the ability of persons skilled in the art, all such modifications being considered within the spirit and scope of the appended claims.

I claim:

1. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support, said system comprising:

a reservoir for said oil mounted upon said support; an oil-displacing pump secured to said engine and coupled therewith for operation thereby to meter oil to said engine;

housing means on said engine forming a pre-heating chamber for said oil, said chamber communicating with said pump; and

conduit means flexibly interconnecting said reservoir and said heating chamber.

2. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support and having an exhaust duct extending therefrom, said system comprising:

a reservoir for said oil mounted upon said support; an oil-displacing pump secured to said engine and coupled therewith for operating thereby to meter oil to said engine;

housing means on said engine, in heat-absorbing relationship with said duct, forming a preheating chamber for said oil, said chamber communicating with said pump; and

conduit means flexibly interconnecting said reservoir and said heating chamber.

3. A system for supplying oil to an internal combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support, said system comprising:

a reservoir for said oil mounted upon said support; an oil-displacing pump coupled with said engine for operation thereby to meter oil to said engine;

housing means forming a preheating chamber for said oil, said chamber communicating with said pump means for securing said pump to said housing means; mounting means adjustably securing said housing means to said engine; and

conduit means flexibly interconnecting said reservoir and said heating chamber.

4. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relating to a support and hav-

5

ing an exhaust duct extending therefrom, said system comprising:

a reservoir for said oil mounted upon said support;
 an oil-displacing pump coupled with said engine for operating thereby to meter oil to said engine;
 housing means in heat-absorbing relationship with said duct, forming a preheating chamber for said oil, said chamber communicating with said pump means for securing said pump to said housing means;
 mounting means adjustably securing said housing means to said engine; and
 conduit means flexibly interconnecting said reservoir and said heating chamber.

5. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support, said system comprising:

a reservoir of light-permeable material for said oil mounted upon said support;
 an oil-displacing pump secured to said engine and coupled therewith for operation thereby to meter oil to said engine;
 housing means on said engine, forming a pre-heating chamber for said oil, said chamber communicating with said pump; and
 conduit means flexibly interconnecting said reservoir and said heating chamber.

6. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support and having an exhaust duct extending therefrom, said system comprising:

a reservoir of light-permeable material for said oil mounted upon said support;
 an oil-displacing pump secured to said engine and coupled therewith for operation thereby to meter oil to said engine;
 housing means on said engine in heat-absorbing relationship with said duct, forming a preheating chamber for said oil, said chamber communicating with pump; and
 conduit means flexibly interconnecting said reservoir and said heating chamber.

7. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support and having an exhaust duct extending therefrom, said system comprising:

a reservoir of light-permeable material for said oil mounted upon said support;
 an oil-displacing pump coupled with said engine for operation thereby to meter oil to said engine;
 housing means in heat absorbing relationship with said duct, forming a preheating chamber for said oil, said chamber communicating with said pump means for securing said pump to said housing means;
 mounting means adjustably securing said housing means to said engine; and

6

conduit means flexibly interconnecting said reservoir and said heating chamber.

8. A system for supplying oil to an internal-combustion engine wherein said oil is admixed with fuel prior to introduction into said engine, said engine being mounted for at least limited vibration relative to a support and having an exhaust duct extending therefrom, said system comprising:

a reservoir for said oil mounted upon said support;
 an oil-displacing pump secured to said engine and coupled therewith said engine for operation thereby to meter oil to said engine;
 housing means on said engine of heat-conductive material in heat-absorbing relationship with said duct, forming a preheating chamber for said oil, said chamber communicating with said pump; and
 conduit means flexibly interconnecting said reservoir and said heating chamber and dimensioned to permit substantially free flow of said oil from said reservoir at substantially any operable viscosity of said oil.

9. A system as defined in claim 8 wherein said duct extends laterally from said engine, said housing means being disposed above said duct, further comprising wall means interposed between said duct and said housing means and forming a substantially vertical heat shaft opening toward said housing means.

10. A system as defined in claim 9, wherein said housing means is formed with a downwardly open concavity registering with said shaft.

11. A system as defined in claim 8 wherein said engine includes a cylinder block, further comprising a transmission tube connecting said pump with said engine, said block being provided with an outwardly open groove receiving said tube at least along a portion thereof.

12. A system as defined in claim 11, wherein said tube is supported in said groove substantially at its midpoint.

13. A system as defined in claim 8, wherein said pump is flanged to said housing means, further comprising mounting means adjustably securing said housing means to said engine, said mounting means including a pivot about which said housing means is displaceable, and locking means for securing said housing means in a selected position about said pivot.

14. A system as defined in claim 8 wherein said support constitutes part of a motor-vehicle body, said engine being mounted upon the chassis of the motor vehicle.

15. A system as defined in claim 14 wherein said support constitutes part of a wheel housing of said body.

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