

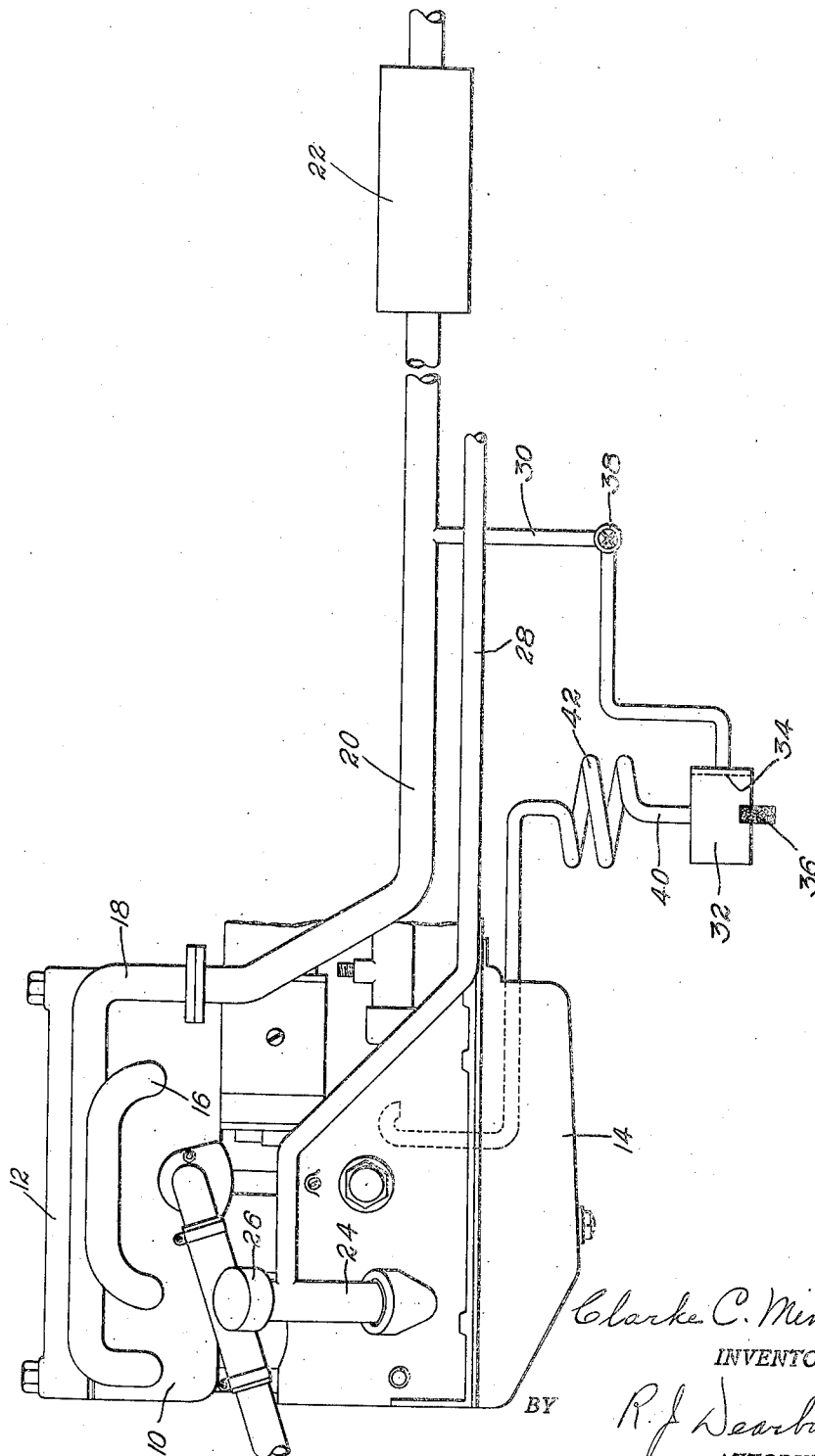
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C. C. MINTER

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APPARATUS FOR INHIBITING THE OXIDATION AND DILUTION OF CRANK CASE OIL

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Clarke C. Minter
INVENTOR
BY R. J. Dearborn
ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR INHIBITING THE OXIDATION AND DILUTION OF CRANK CASE OIL

Clarke C. Minter, East Orange, N. J.

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This invention relates to a method and apparatus for inhibiting the deterioration of oil in the crankcase of an internal combustion engine.

In the operation of internal combustion engines such as automobile engines it is important to maintain the moving parts properly lubricated in order to prevent undue wear and to insure efficient operation. Certain of the parts, such as the crankcase and connecting rods, are ordinarily lubricated with oil contained in a crankcase positioned directly beneath the cylinder block. The lubricant in the crankcase is supplied to the parts to be lubricated in various ways such as by the so-called splash system or the so-called forced feed system.

The lower part of the crankcase serves as a reservoir or sump for the lubricant or oil supply. It is not unusual for considerable quantities of raw gasoline or gasoline vapors to be drawn into the cylinders of the engine, particularly when starting the engine in cold weather. In such cases the unvaporized gasoline and the gasoline vapors tend to work down past the pistons and finally reach the crankcase where they come in contact with the exposed surface of the oil and dilute it so that its viscosity characteristics are changed. If this dilution is considerable it decreases the lubricating value of the oil, and undue wear of the cylinder walls and the moving parts of the engine is likely to follow on account of improper or insufficient lubrication.

Engineers and others have recently made attempts to remedy the condition just described and to this end have proposed that a circulation of atmospheric air be maintained through the crankcase to continuously remove therefrom any gasoline vapors that may be present. However, the introduction of atmospheric air to the crankcase is only a partial remedy for the conditions caused by the presence of gasoline vapors because the oxygen in the air thus entering the crankcase acts upon the oil in the reservoir and on the walls and moving parts of the engine to form oxidation products such as aldehydes, alcohols and acids of the higher hydrocarbons.

These partial oxidation products dissolve in the unchanged oil and are present in the film of oil on the cylinder walls. When the engine piston moves down after the explosion the oil film is exposed to the hot products of combustion and some of these partial oxidation products are vaporized and pass out through the exhaust. If no partial oxidation products are present in the oil film, the exhaust will have little or none of the objectionable characteristics it usually possesses. Simi-

larly, the vapors issuing from the breather tube of the crankcase possess obnoxious odors quite similar to those of the exhaust gas. These partial oxidation products are very disagreeable substances and when vaporized are highly irritable to the eyes and mucous membrane.

It is an object of my invention to inhibit or prevent the oxidation of the lubricating oil in the crankcase of internal combustion engines such, for example, as automobile engines, and to thereby prevent deterioration of the lubricating oil and the formation of oxidation products having objectionable or obnoxious odors. It is a further object of my invention to provide means for maintaining a constant circulation of substantially oxygen free or inert gases through the crankcase of internal combustion engines in order to exclude the atmospheric air normally present in crankcases and to prevent the formation of oxidation products. Another object of my invention is to provide means for utilizing the exhaust gases, resulting from the operation of internal combustion engines, as the inert gaseous element for preventing oxidation and dilution of the crank case oil.

Other objects, features and advantages of my invention will appear as the description thereof progresses, reference being had to the accompanying drawing which shows in side elevation a portion of an automobile engine.

In the drawing there is illustrated an automobile engine cylinder block 10 provided with a head 12 and a crankcase 14. The cylinder block 10 is provided with an intake manifold 16 and an exhaust manifold 18 to which is connected an exhaust pipe 20 which normally extends beneath and to the rear of the car and which is provided with a muffler 22. A breather pipe 24 connects with the interior of the crankcase 14 at a point above the normal level of the oil. The pipe 24 is closed by a cap 26. An outlet pipe 28 connects with the breather pipe 24 and extends towards the rear of the car so that exhaust gases passing therethrough may be discharged to the atmosphere at a point.

A pipe 30 of restricted diameter connects at one end either with the manifold 18 or with the exhaust pipe 20 at a point between the cylinder block 10 and the muffler 22. The opposite end of pipe 30 connects with a trap 32 which is provided with a filter or wire screen 34 and a wick 36 in the bottom thereof. Pipe 30 is provided with a valve 38. A pipe 40 connects at one end with the upper or vapor portion of trap 32 and its opposite end extends into the crankcase 14 with its open end above the normal level of the oil in the crank-

case. Pipe 40 is formed or provided intermediate its ends with a coil 42 or other means for cooling the gases passing therethrough.

The operation of my apparatus is as follows:

5 The exhaust gases escaping from the cylinders pass through manifold 18, exhaust pipe 20 and normally pass through the muffler 22 and then to the atmosphere. The presence of the muffler in the exhaust pipe 20 results in the creation of a
10 small amount of pressure in both the exhaust pipe and manifold. As already explained, pipe 30 is of restricted diameter and connects with the exhaust pipe 20 and is provided with a valve 38 and, by adjusting the position of this valve, regulated
15 quantities of exhaust gases, which are substantially free of oxygen by reason of the fact that they have been burned within the cylinders of the engine, are permitted to flow to the trap 32. Any carbon particles present are removed by the
20 filter 34 and any condensation products settling to the bottom of the trap are drained off through the wick 36. The substantially moisture and oxygen free gases then pass from the trap through pipe 40 and coil 42 into the crankcase 14.

25 The constant circulation of exhaust gases from the exhaust pipe 20 to the crankcase 14 causes any atmospheric air present in the crankcase to be discharged through the breather pipe 24 and the outlet pipe 28. Thus, at all times while the
30 engine is operating, a continuous flow of substantially oxygen free exhaust gas from the exhaust pipe 20 is maintained to and through the crankcase, and as this gas contacts with the exposed surface of the oil, both in the reservoir of the
35 crankcase, as well as on the lower parts of the cylinder walls and on the moving parts of the engine, oxidation of the oil is inhibited because there is insufficient oxygen in the exhaust gas to react with the oil to form oxidation products.
40 There is sufficient pressure in the exhaust manifold 18 and pipe 20 to insure a circulation of the exhaust gas through pipes 30 and 40 to the crankcase 14 and the amount of gas delivered to the crankcase is readily controlled by proper adjustment of the valve 38.
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The exhaust gases in the pipe 20 are, of course, hot, and it is desirable that they be considerably cooled before they are introduced into the crankcase. This cooling is effected in the pipes 30 and
50 40, the length of the latter being increased by the coil 42 so as to prolong the time during which the gases are in transit to permit adequate cooling thereof.

Experiments have shown that where a sub-

stantially oxygen free gas, such as the exhaust gas from an internal combustion engine, is circulated through the crankcase in the manner described, the exhaust gases and the gases emerging from the breather pipe do not have the
80 annoying characteristics, such as obnoxious odors, which are usually present when air is present in the crankcase. Furthermore, the oil does not deteriorate as rapidly as when air is present and more efficient operation of engines
85 employing this system results. While I have described the use of exhaust gas as a medium for preventing the oxidation of crankcase oil it is apparent that any other inert or substantially oxygen free gas can be used for this purpose and
90 the use of exhaust gas has been particularly described for illustrative purposes only and because it is available during the operation of internal combustion engines.

Obviously many modifications and variations
95 of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. The combination with an internal combustion engine having a crankcase and an exhaust manifold, of a conduit connecting the manifold with the crankcase, means intermediate the ends
105 of said conduit for cooling the exhaust gases passing from said manifold to said crankcase through the conduit, and means for regulating the passage of the gases through said conduit.

2. The combination with an internal combustion engine having a crankcase and an exhaust manifold, of a conduit connecting the manifold and the crankcase through which exhaust gases may pass from the former to the latter, and means intermediate the ends of said conduit for
115 collecting and removing any condensation products present in the conduit.

3. The combination with an internal combustion engine having a crankcase, an exhaust manifold and a breather pipe connecting with the crankcase, of a conduit connecting the manifold with the crankcase and through which exhaust gases can pass from the manifold to the crankcase, and a conduit connecting at one end with the breather pipe and extending towards the rear
120 of the car for removing gases and air from the crankcase.

CLARKE C. MINTER.

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