Oct. 20, 1959

K. A. WATKINS

2,909,284

ENGINE OIL REFINER

Filed Nov. 8, 1954

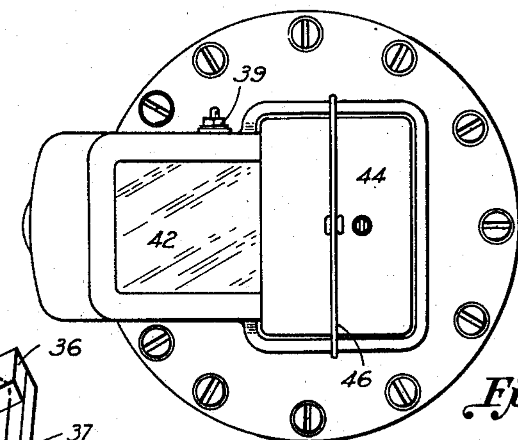

Fig. 2.

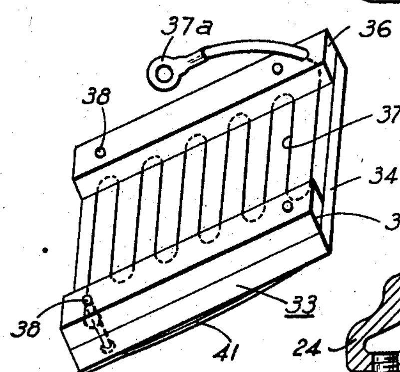

Fig. 3.

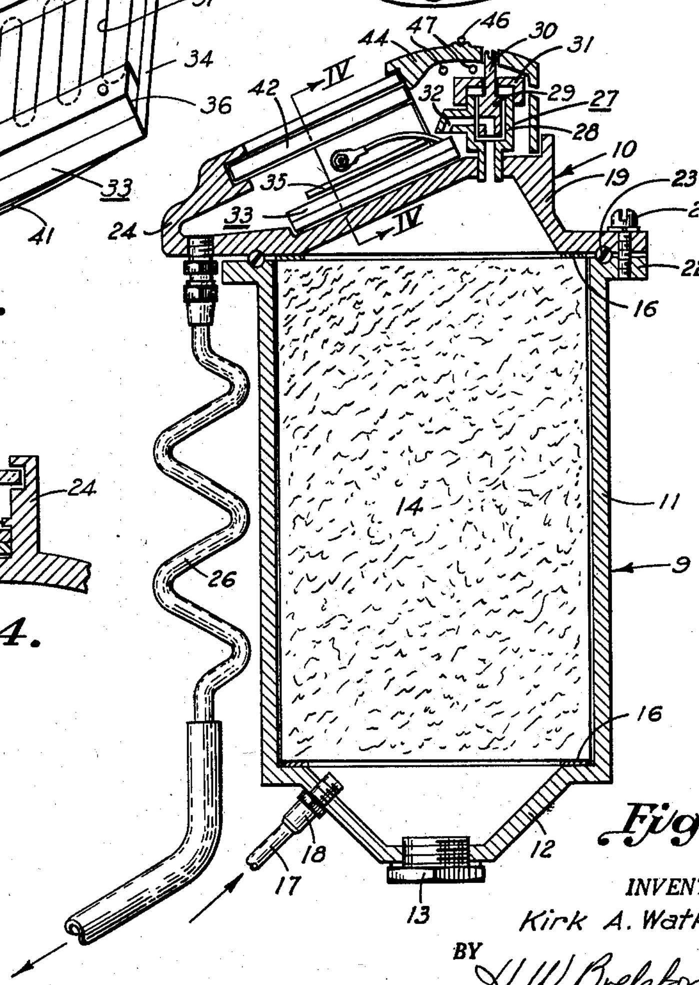

Fig. 1.

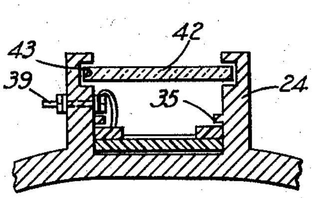

Fig. 4.

INVENTOR.
Kirk A. Watkins

BY H. W. Brelsford

ATTORNEY

United States Patent Office

2,909,284

Patented Oct. 20, 1959

2,909,284

ENGINE OIL REFINER

Kirk A. Watkins, Carpinteria, Calif.

Application November 8, 1954, Serial No. 467,268

2 Claims. (Cl. 210—95)

My invention relates to oil refining apparatus that is carried by or connected with an internal combustion engine so that the lubricating oil may be continuously purified and cleansed, and has particular reference to such apparatus wherein the heating element is an electrical resistor.

It is well known that in the ordinary operation of motor vehicles their lubricating oil becomes contaminated. The oil in the crankcase may become diluted with gasoline or other fuel that escapes past the pistons. Water may be introduced due to condensation of moisture in the air upon cold metal surface. Sulphuric acid, sulphurous acid and other acids are formed due to small amounts of impurities in the fuel. Fuel additives give rise to injurious substances. Due to these and other factors lubricating oils quickly become impure, reducing their efficiency.

This reduced efficiency is present continuously but its presence is more realized under extreme conditions. For example, in freezing weather it is not unusual for crankcase dilution by gasoline to become so extreme on short trip operations that bearings are burned out. Acid from impure fuels may etch bearings to the point of failure. Also cold weather accentuates condensation causing oil-water emulsions that have practically no lubricating value and bearing failures have resulted from this cause also. These deficiencies of lubricating oil are real problems, continuously present and impairing lubrication and must be eliminated for greatest engine life.

Various oil refiners for attachment to engines have been devised to purify lubricating oils. Some employ exhaust gases as a heat source for vaporizing water and light fuel fractions such as gasoline. Others employ electrical resistance conductors energized from the engine. However, the shapes selected in these prior art devices have been such that the oil does not flow evenly across the electrical conductors and does not cool them evenly with the result that hot spots develop in the electrical heaters which cause decomposition of the oil and gumming of the oil around the hot spots. These hot spots eventually spread as a result of this action seriously impairing the heating action and limiting the life of the electrical heaters. I have discovered, however, that if the electrical resistance wire is placed in the bottom of a trough over which the oil flows, that superior refining results occur compared to other arrangements and configurations previously employed.

It is a general object of my invention to produce an improved lubricating oil refiner for internal combustion engines.

A further object is to provide an improved electrical heater for engine oil refiners.

Another object is to provide an oil refiner that reduces acid by chemical action in addition to heat.

Other objects and advantages of my invention will be apparent in the following description and claims considered together with the accompanying drawings forming an integral part of this specification and in which:

Fig. 1 is an elevation view in full section of a combined filter and refiner embodying my invention;

Fig. 2 is a top view of the apparatus in Fig. 1;

Fig. 3 is an enlarged isometric view of the heater element illustrated in Fig. 1;

Fig. 4 is a sectional view along the line IV—IV of Fig. 1.

I prefer to operate my oil refiner in combination with an oil filter. The oil filter removes solid particles from the lubricating oil such as metal particles from bearings and cylinder walls, carbon particles that blow past the piston rings, and decomposed oil and other substances generally referred to as sludge. This removal of solid particles permits close regulation of flow through my refiner without clogging the regulating valve. My refiner in turn removes the liquid impurities and the impurities in solution.

Referring to Figs. 1 and 2, the invention is shown in combination with an oil filter as just mentioned. The oil filter unit may be designated by the numeral **9**, and my refiner by the numeral **10**. The oil filter may be of conventional construction employing a cylindrical housing **11** having a conically projecting bottom **12** which retains a cleanout plug **13**. This plug may assist in the removal of accumulated sludge. Disposed in the housing or shell **11** may be a filter element **14** preferably of the removable or cartridge type. Unlike some cartridges which are designed for radial flow, the present cartridge is designed for lengthwise flow; that is, flow parallel to the cylinder axis. Seals **16** may be employed to prevent flow about the outside of the cartridge. An inlet tube **17** connected to the oil pump of the engine may be connected to the conical bottom **12** by a check valve **18**. The filter **9** may be secured to the engine by any suitable means.

My refiner **10** is preferably, but not necessarily, constructed in a cap **19** for the filter **9**. The refiner cap **19** may be secured over the top of housing **11** by suitable fasteners such as screws **21** passing through an outwardly flared flange **22** on the shell **11**. A seal **23** of any appropriate construction may seal the cap **19** to the shell **11**. The cap **19** may have an outwardly projecting pocket **24** disposed on top of the cap to which may be connected an outlet tube **26**. This tube may be helical or spiral in shape to gain additional length for oil cooling purposes.

The material of the tube **26** is provided particularly in accordance with the invention and is made of a chemically reactive metal such as magnesium so that the acids that escape the heater of my refiner will chemically react with the tube to become neutralized. The additional length provided by the helical construction not only offers greater cooling but additionally presents a greater reactive surface, permitting relatively large amounts of engine acid to become neutralized. With fuels of ordinary purity the magnesium tube **26** may have a chemical life well in excess of one year, but replacement yearly is recommended to present clean uncoated surfaces to the oil, thus obtaining maximum reaction.

The details of construction of the refiner will now be described with reference to all figures. Secured to the cap **19** in communication with the shell **11** is a valve **27** of any suitable construction. For explanatory purposes a rotary valve is illustrated having a stationary housing **28** in which is disposed a rotor **29** retained in place by a nut **31**. The rotor **29** may have a stem **30** projecting through the nut and its upper end may be suitably formed to receive a hand tool; for example, a slot for receiving a screw driver. This valve construction allows precise control of the oil flow through the refiner.

The valve housing 28 may have an outlet 32 which delivers oil to an inclined trough 33 provided particularly in accordance with the invention. This trough is formed of electrically insulating material capable of withstanding high temperatures. The trough may have a bottom 34, sidewalls 36 and an electrical resistance wire 37. While the physical construction may take various forms, I prefer at present to make the sidewalls 36 of separate structural pieces inasmuch as these afford a means of retaining the resistance wire in place. Accordingly, the resistance wire 37 may be formed into a sinuous path with the ends of the sine waves projecting under the side pieces 36 where they are mechanically gripped in place. The side pieces 36 may be secured to the bottom piece 34 by suitable fasteners such as rivets 38. The trough may be held in place by a pair of projecting ribs 35 on the walls of pocket 24. The wire in the bottom of the trough is not insulated and is exposed or bare wire.

Electrical energy may be supplied by a lead 37*a* which may be connected to an insulated hot terminal 39 set in the sidewall of pocket 24. The other end of the resistance wire 37 may be connected to ground and for this purpose a ground strip 41 may be secured to the bottom 34 and may be mechanically and electrically connected by rivet 38 to which the wire 37 may also be connected.

The length of the trough may be varied with respect to its width to get more or less exposure of wire. The resistance of the wire and the applied voltage may be so selected that the wire temperature is approximately at the boiling point of the oil being refined. Temperatures greatly in excess of this will tend to carbonize the oil.

The flow of the oil over the wires is so regulated by valve 27 that the oil is heated greatly above the boiling point of water and the minimum temperature may be from 250° to 400° F. These oil temperatures cause all water and fuel to evaporate. This boiling and heating may be observed through a window which may be a piece of glass 42 retained in slots 43 in the sidewalls of the pocket 24. The glass may be kept in position by a removable valve cover 44 set in place on top of the cap 10 and the cover in turn may be removably held by a fastener such as a spring bail 46. Breather holes 47 may be formed in the valve cover 44 to permit escape of the fumes of water, fuel acids or other contaminants.

In operation, the inlet 17 may be connected to an oil pump by a branch line, and this branch may have a bypass if desired to avoid excessive oil pressures in the filter. The oil flows through the filter mass 14 wherein solid particles and sludge are removed, and then flows to the control valve 27. Oil drips or slowly flows from the valve outlet 32 onto the inclined trough 33 whereupon it is heated by the resistance wires 37 laced across its bottom. The oil thereupon becomes heated to a high temperature which vaporizes the contaminating fuel and water. The heat also decomposes acids, and the vapors resulting flow out the vent holes 47. The operation of the refining may be observed through the window 42 so that actual bubbling and gas formation at the resistance wire may be noted. The heat refined oil then passes through the outlet tube 26, of magnesium or other reactive metal (such as aluminum), and any remaining acid will react with the tube to become neutralized. The tube 26 also cools the oil before it is returned to the engine.

The uniform distribution of the wires over the flat trough bottom permits maximum heat efficiency inasmuch as there is no cooling due to surrounding air. No hot spots develop because oil flows over all of the wires because of the physical construction of the trough. The oil is heated to a maximum temperature short of carbonization or decomposition because of the close regulation of oil flow made possible by the valve 27. This high temperature insures a maximum amount of heat refining, eliminating fuels, water, acids and other contaminants.

While I have described my invention with respect to specific embodiments thereof, it will be apparent to those skilled in the art that various modifications could be made. For example breathing at the holes 47 could be accelerated by a venturi pump so located as to receive the air blast of the engine fan. Different metals for the outlet tube could be used. Other structures for securing the resistance wire in place could also be used. For these reasons the application is not limited to the specific embodiments illustrated nor limited in any other way, but includes all modifications and variations as fall within the true spirit and scope of the invention.

I claim:

1. A trough for use in an oil refiner of the thermal type mounted on an automotive vehicle comprising: a flat sheet of electrical insulating and temperature resisting material; an electrical resistance wire disposed on the sheet in a sinuous pattern; a pair of side bars secured to the sheet over the loop ends of the sinuous wire; fasteners securing the side bars to sheet and thereby frictionally gripping the resistance wire; and a ground strip of metal mechanically secured to the sheet and electrically connected to the resistance wire.

2. A refiner mechanically constructed in a cap for an oil filter comprising: a cap housing having an outlet; a valve controlling the flow through the cap outlet; a pocket formed on the top of the cap; a flat bottom trough disposed on the bottom of the pocket and having an electrical resistance wire disposed over the bottom of the trough; a transparent viewing window mounted on the pocket above the trough; a removable valve cover disposed over the valve and retaining the window in position and having vent apertures therein; means for supplying electrical current to the resistance wire, and an outlet tube for the pocket made of magnesium metal whereby oil flowing from the filter is controlled by the valve to flow over the resistance wires in the trough to become heated so that liquid impurities therein will be removed and the remaining acid in the oil will chemically react with the magnesium tube.

References Cited in the file of this patent

UNITED STATES PATENTS

781,936	Cook	Feb. 7, 1905
1,119,840	Kuhn	Dec. 8, 1914
1,703,648	Van Brunt et al.	Feb. 26, 1929
1,752,050	Young	Mar. 25, 1930
1,792,843	Kamrath	Feb. 17, 1931
1,862,003	Carlisle et al.	June 7, 1932
2,161,964	La Breque	June 13, 1939
2,219,101	Finwall	Oct. 22, 1940
2,255,518	Norton	Sept. 9, 1941
2,392,548	Pogue	Jan. 8, 1946
2,553,561	Evans	May 22, 1951

FOREIGN PATENTS

973,621	France	Sept. 20, 1950