This invention relates to lubricating systems, and has particular reference to a system which is interconnected with internal combustion engines used on automotive vehicles.

While the engine is running, and the oil in the system is heated up, it is a relatively easy matter to pass off the unnecessary diluents in the oil by means of a crankcase ventilation system. However, when the engine has stopped and the oil in the system becomes cold, the diluents are not so easily removed and tend to gather in pockets at various parts of the system. Moreover, when the oil is cold and in a pure state it is too thick or too viscous and interferes with starting, especially during cold weather. It is therefore desirable to have a diluent present during starting which will decrease the viscosity of the oil. This diluent is in the form of gasoline which leaks past the pistons and drops into the crankcase. However, during the starting period, an additional and increased amount of gasoline gets past the pistons and contaminates and excessively dilutes the oil and use is therefore made of the arrangement disclosed in the present invention to remove excess impurities (principally gasoline) while the lubricant is cold. When the oil is heated up, the impurity remover is cut out for the reason that it would produce an excessive heating of the oil which is injurious. It is therefore the object of the present invention to devise a lubricating system which has incorporated therein a means for removing the diluents and impurities from the oil while in its cold state. The system is preferably applied to only the filtered oil coming from the usual oil filter incorporated in the lubricating systems of internal combustion engines, although it may be applied to the unfiltered oil as well.

The object of the invention is accomplished by placing in the outflow pipe of the filter which conducts the filtered oil back to the lubricating system, a control in the form of a valve which may be turned so as to cause the filtered oil to flow directly to the crankcase or to a rectifier. The rectifier has an overflow pipe returning the oil to the crankcase and allowing for an air space in the top thereof. This air space is connected to the carburetor inlet so that portion of the air drawn in by the carburetor will come from the rectifier, and serve to carry along the diluent or contaminating vapors from the oil.

The customary exhaust tube used on internal combustion engines has a pipe or conduit connected thereto, and leading past a rectifier. In this conduit, there is placed a control in the form of a valve interconnected with the valve control in the filter outlet pipe, and by turning the control in the exhaust pipe, a more or less amount of exhaust gases will be caused to flow past the rectifier to deliver heat thereto.

The controls or valves in the outlet pipe or in the exhaust gas conduit are simultaneously and automatically operated by means of a heat sensitive element in the form of a bimetallic rod. The rod is positioned in the bottom of the oil pan, and its normal position is curved. When the oil in the system is cold the control or valve in the outflow pipe will cause the filtered oil to flow to the rectifier, however, as the oil in the oil pan heats up, the rod will straighten and by means of an arm will operate the interconnected valves to throw them to a position which will gradually stop the flow of exhaust gases through the exhaust conduit, and gradually change the direction of flow of filtered oil from the rectifier to the oil pan or crankcase.

In the drawing:

Figure 1 shows a side view of an internal combustion engine with the invention applied thereto.

Figure 2 is a diagrammatic sectional view of the valves and their operating mechanism, the dotted lines showing the hot oil position of the parts.

Referring to the numbered parts on the drawing, 10 indicates an internal combustion engine as a whole, 12 the crankcase thereof, and 14 the oil pan. The usual filter 16 receives oil from inlet pipe 18 connected within the oil pan or crankcase to the conventional oil pump (not shown). The filter 16 has the outlet pipe 20, which returns the oil to the oil pan 14 by means of the connection as shown at 22.
The engine has interrelated therewith the usual exhaust system 24 comprising the exhaus manifold 26, and the exhaust tube 28. There is also interrelated with the engine the usual carburetor 30 and the riser 32 leading to the intake manifold 34. These parts per se are conventional and form no part of the invention except insofar as they relate to the combination.

Positioned in the path of the filter outflow pipe 29 at the point 35 is a control 36, in the form of a valve as is best seen in Figure 2. This valve has a stem 38, the inner portion of which extends within the crankcase, and has connected thereto an arm 40, which serves to operate the valve. The outer portion of the stem 38 extends without the oil pan and has a second arm 42 connected therewith, the purpose of which will later be described.

The valve 36 is positioned within a valve housing 44 to which the filter outflow pipe 29 is connected. The housing 44 also has attached thereto the connection 22 leading to the oil pan, and a third connection, or piping 46 which leads to a rectifier 48, secured to the engine in any suitable way. The rectifier 48 has an overflow pipe 50 leading into the crankcase as at 52, to permit the outflow of oil, or the return of the oil to the lubricating system. The upper portion of the rectifier 48 has connected thereto a pipe or tube 54, connected to the inlet 56 of the carburetor 30. As the carburetor draws the air for the carburetion of the gasoline, it will draw a portion of its air from the rectifier 48 and pull along therewith any vaporized diluent or impurity.

As the outflow pipe 50 is considerably larger than is necessary to permit the outflow of oil to the crankcase, there will always be a more or less flow of air from the crankcase through the pipe 50 to the space 58 above the oil level 60 in the rectifier and from this space through the pipe or tube 54 into the carburetor, to assist in the removal of any diluent vapors from the lubricating system.

Connected with the exhaust system 24 of the engine, and preferably at the exhaust tube 28, is a pipe or conduit 62, which receives the exhaust gases at the point 64 and returns them to the tube 28 at the point 66. At any suitable point within the pipe 62, at 68, there is positioned a valve 70 (preferably of the butterfly type), secured to a stem 72, which has an operating arm 74 attached thereto. The object of the valve 70 is to control the flow of exhaust gases entering the opening 64 and passing through the pipe 62.

The arm 42 of the stem 38 of the valve 36, and arm 74 of the valve 70 are interconnected by means of a common link 76 so as to cause a simultaneous operation of both valves.

Positioned in the bottom of the oil pan 14, such as by a suitably shaped block 78, is a thermostatic element 80 in the form of a bimetallic rod whose normal position is shown in the curved dotted outline 80'. The end of the thermostatic element 80 is provided with an ear 81 which is pivoted as at 82 to a link 84, which in turn is pivoted at its opposite end as at 86 to the arm 40 of the stem 38 of valve 36. From the construction as described, it will be obvious, that as the thermostatic element 80 bends, it will move the link 84 and by means of the arm 40 and stem 38, will cause a swinging of the arm 42, link 76 and arm 74 to throw the butterfly valve 70 in the exhaust conduit 62.

The normal position of the parts while the engine is running is shown in full lines in Figure 2. This condition is obtained when the oil in the oil pan is heated and has caused the thermostatic element 80 to assume the full line position. With the valve 36 in the position shown, the filtered oil will pass from the outflow pipe 29, through the valve 36, into the connection 22 and on to the crankcase, none of the filtered oil then passing through the rectifier. When the oil is cold and the thermostatic element 80 assumes the dotted line position of Figure 2, the linkage and the valves will be thrown to the dotted line position. From an examination of Figure 2, it will be seen that the valve passage to the pipe 22 is closed but is open to the rectifier pipe 46 and oil instead of passing through the pipe 22, will now flow into the pipe 46 and on to the rectifier. At the same time, the valve 70 (which is now in its dotted line position), will permit the exhaust gases to flow substantially without obstruction through the pipe 62 and due to the juxtaposition of this pipe with the rectifier, the heat from exhaust gases will be caused to be delivered to the rectifier and thereby heat the oil and vaporize any diluents therein. These diluents will then be sucked through the pipes 54, and into the firing chambers, through the carburetor 30.

From the construction described, it will be apparent that intermediate temperatures will produce a more or less straightening of the thermostat 80, and thereby bring about an intermediary position of the valve 36 to permit the oil to flow to one or other of the outlets 22 or 46. This intermediate temperature will also produce a corresponding intermediary position of the valve 70 and permit the more or less flow of exhaust gas through the conduit or pipe 62.

We claim:

1. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and means
for simultaneously operating both said controls.

2. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a valve in said returning means, means for diverting exhaust gas toward the rectifier, a valve in said diverting means, and means for simultaneously operating both said valves.

3. In combination with an internal combustion engine, having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and a link connected to operating arms of said controls for simultaneously operating both said controls.

4. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and means for simultaneously and automatically operating both said controls.

5. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and means for simultaneously operating both said controls, and means for automatically operating said last named means.

6. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and means for simultaneously operating both said controls, and means including a heat sensitive element for automatically operating said last named means.

7. In combination with an internal combustion engine having an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, and means including a heat sensitive element for simultaneously and automatically operating both said controls.

8. In combination with an internal combustion engine having a carburetor, an exhaust system and a lubricating system interrelated therewith, a filter in said lubricating system, means for causing lubricant to flow to the filter, means for returning the filtered lubricant to the lubricating system, rectifying means and a control in said returning means, means for diverting exhaust gas toward the rectifier, a control in said diverting means, means for simultaneously operating both said controls, an overflow pipe leading from said rectifier to the lubricating system, said overflow pipe providing an air space above the lubricant in the rectifier, and a connection from the air space to the carburetor whereby diluents are drawn from the oil.

In testimony whereof we affix our signatures.

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