Jan. 8, 1946. C. N. POGUE 2,392,548

OIL REFINING DEVICE

Filed Sept. 7, 1943 2 Sheets-Sheet 1

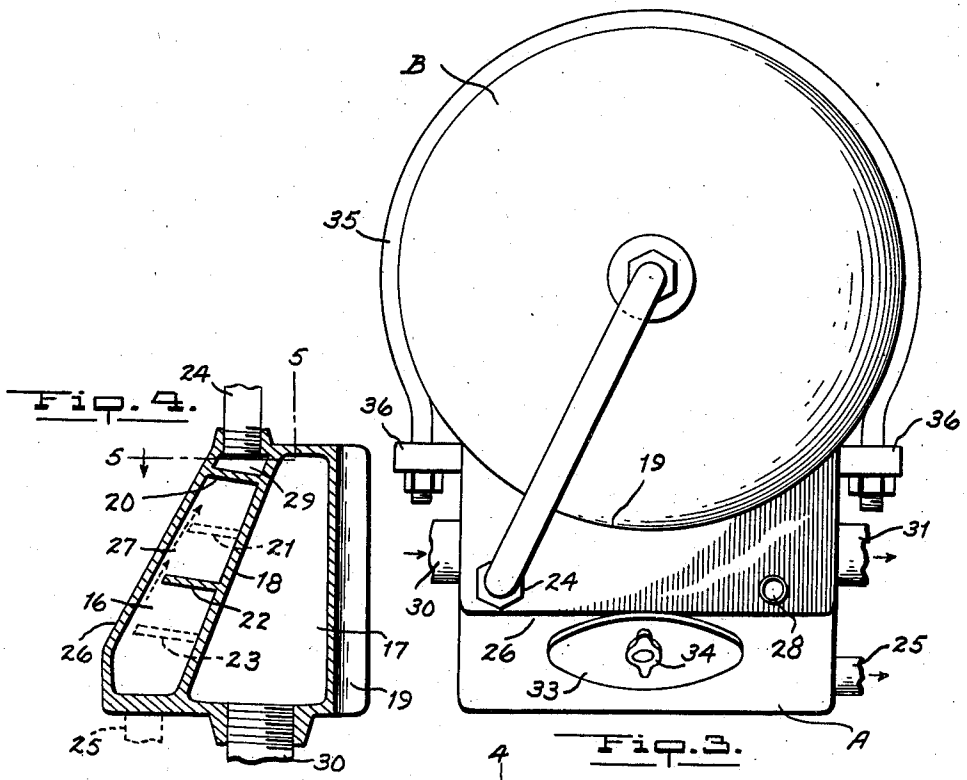

Fig. 3.

Fig. 4.

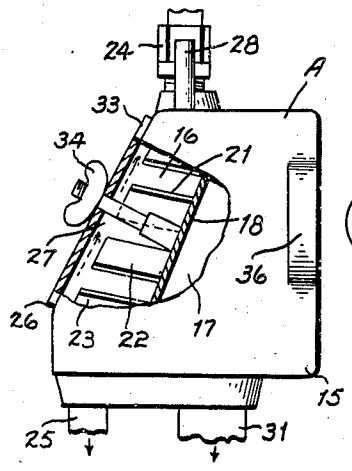

Fig. 2.

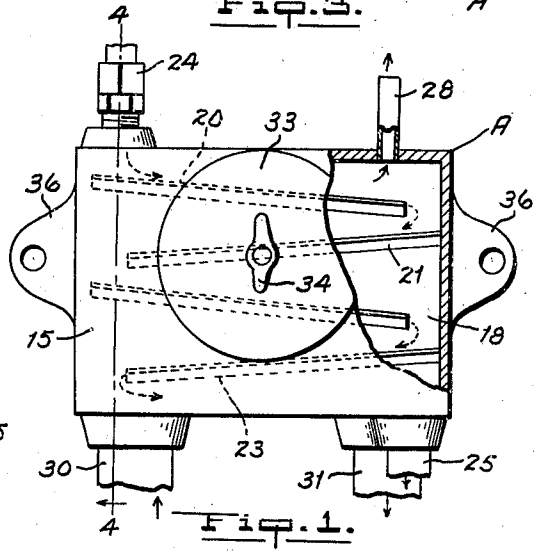

Fig. 1.

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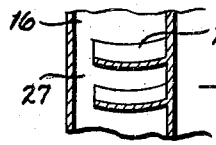

Fig. 6.

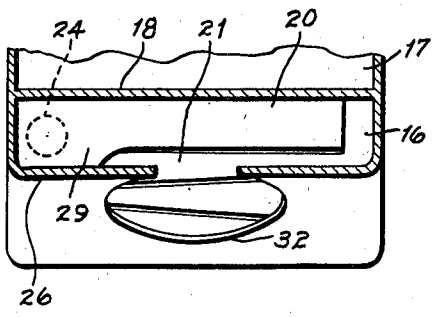

Fig. 5.

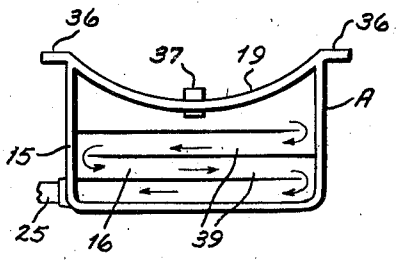

Fig. 9.

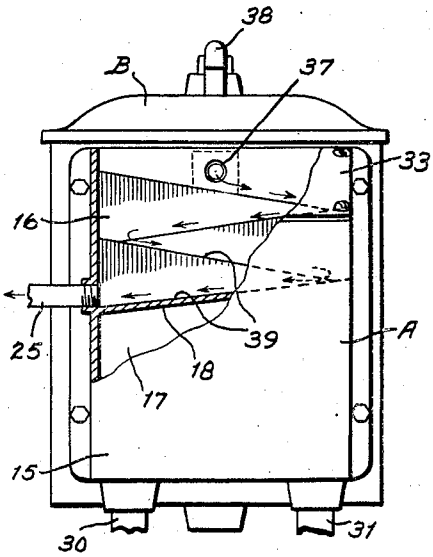

Fig. 8.

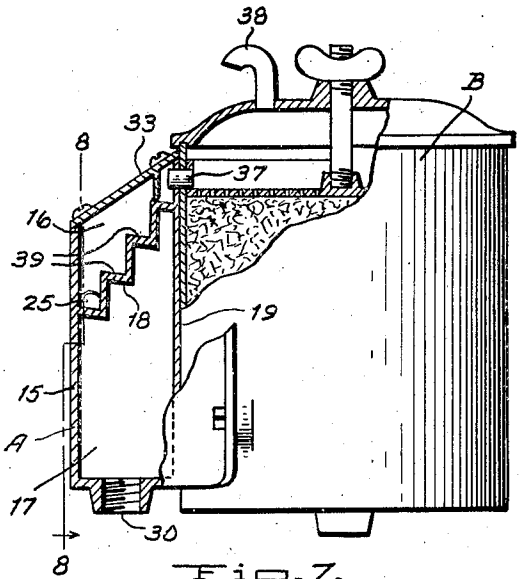

Fig. 7.

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UNITED STATES PATENT OFFICE

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OIL REFINING DEVICE

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Application September 7, 1943, Serial No. 501,507
In Canada September 5, 1942

3 Claims. (Cl. 196—16)

(Granted under the provisions of sec. 14, act of March 2, 1927; 357 O. G. 5)

This invention relates to oil refining devices and has more particular reference to devices of this nature employed in connection with motor vehicles.

In the ordinary operation of motor vehicles or power plants employing internal combustion engines, it is a well known fact that after a relatively short period of operation of the engine, oil in the crank case or sump becomes contaminated with objectionable substances such as gasoline, distillate, water condensate, sulphuric acid and so forth and from their very nature it is quite evident that such substances, when diluted with oil, reduce the efficiency of its lubricating properties to such an extent that it does not properly perform its functions as a lubricant. It is also well known that lubricating oil diluted with the aforementioned contaminating influences causes moving parts, bearing parts and wearing surfaces to be subjected to unusual, uneven and excessive wear and abuse during operation which eventually results in breakdowns and not infrequently places vehicles in the out-of-commission class. This apart from the power losses, inefficiency of operation and the added cost of frequent oil changes, repair delays and operational losses all of which is especially serious where motor transport is concerned.

In order to avoid and overcome the foregoing and other objections and difficulties I provide a device which operates to refine oil as it circulates through the lubricating system during operation of the engine. One of the objects of the present invention therefore is to provide a device of this character which will remove the aforementioned objectionable substances from oil during the normal operation of motor vehicles, continuously maintain the oil at a high standard of efficiency and quality and lubricating properties and eliminate the high cost of oil changes, repairs and attendant delays.

Another object of the present invention is to provide a device of this character which may readily and easily be attached or connected to a conventional oil filter of motor vehicles now in operation for refining the lubricating oil after the filtering operation.

A further object of the present invention is to provide a device of this character which utilizes the spent hot gases of combustion to drive-off the objectionable volatiles and vapors entrained in the lubricating oil during engine operation.

A still further object of the invention is to provide a device of this character which transmits heat to the oil filter to which it is attached during the operation of the motor vehicle and thereby adds to the efficiency of the operation of the oil filter especially during motor vehicle operation under cold weather conditions.

Yet a further object of the present invention is to provide a device of this character wherein the lubricating oil is passed over a series of substantially flat heated surfaces in a relatively thin film to effectively drive-off the objectionable volatiles and vapors.

Still another object of the present invention is to provide a device of this character which may be constructed of low grade metals, is simple in structure, economical to manufacture and one that will more satisfactorily perform the functions required of it.

Having regard to the foregoing and other objects and advantages which will become apparent as the description proceeds and the details become known, the invention consists essentially in the novel combination and arrangement of parts hereinafter described in detail and illustrated in the accompanying drawings in which;

Fig. 1 is a front elevational view of an embodiment of the present invention with a portion of the housing broken away to more clearly disclose the inner structure.

Fig. 2 is an end view of Fig. 1 with a portion of the housing broken away for clearer structural understanding.

Fig. 3 is a plan view of an embodiment of the present invention shown attached to a conventional oil filter.

Fig. 4 is a section taken on the line 4—4 of Fig. 1.

Fig. 5 is a section taken on the line 5—5 of Fig. 4.

Fig. 6 is a modification of the baffle structure shown in fragmentary sectional detail.

Fig. 7 illustrates a modified embodiment of the invention shown partly in section and attached to a conventional oil filter.

Fig. 8 is a section taken on the line 8—8 of Fig. 7, and

Fig. 9 is a plan view of the oil refiner illustrated in Fig. 7 with the cover member removed for purposes of more clearly illustrating the structural arrangement.

Referring now to the accompanying drawings wherein the present invention is disclosed and wherein like letters and numerals of reference designate corresponding parts in the several illustrations, the letter A indicates the present invention as a whole while the letter B in-

dicates a conventional type of oil filter to which it may be attached.

The invention may of course take any appropriate size, shape or form and in general terms comprises a housing or container member 15 subdivided into what may be termed a refining or distillation chamber 16 and a heat chamber 17 by means of a dividing wall 18. It is important to observe that the outer wall of the heat chamber is formed with an arcuately curved wall 19 so that the device may snugly and tightly fit the annular side wall surface of the filter B.

Interiorly of the refining chamber I provide a series of longitudinally extending baffle members 20, 21, 22 and 23 in spaced, staggered and stepped relationship to provide a tortuous or sinuous path of travel from the oil inlet 24 to the oil outlet 25 (see Fig. 1).

By more particular reference to Figs. 1, 2 and 3, it will be seen that the baffle members 20, 21, 22 and 23 forming the tortuous path of travel are arranged at an angle to the horizontal both laterally and longitudinally to insure liquids thereon a tortuous path flow through the refining chamber. In addition to the foregoing, the baffle members are formed integral with the dividing wall 18 of the heat chamber but are spaced in relation to the front wall 26 of the refining chamber. The spacing of the baffle members from the front wall 26 provides a passageway or path 27 within the refining chamber which enables the volatile gases and water vapors to travel upward free of the baffle members to be discharged to the atmosphere through a suitable vapor outlet 28, the path of travel of the vapors and gases being clearly indicated by dotted line arrows in Figs. 2 and 4. It is further important to observe that the angle and disposition of the baffle members both laterally and longitudinally is sufficient to prevent oil from flowing over their sides laterally and at the same time causing the liquids to move over the longitudinal, tortuous path in a continuous even flow with a relatively thin film of oil spread over the substantially flat surfaces of the baffle members from the point of introduction to the discharge as indicated by dotted lines in arrow form as seen in Fig. 1. The substantially flat type of baffle structure observed in Figs. 1 to 5 inclusive is arranged at an angle to the horizontal laterally and is preferred in form; however other types of structure may be employed without departing from the spirit of the invention. For example, the baffle members may be concave or slightly dished as indicated at 23*a* in Fig. 6 or modified V shape all within the scope of the invention.

As a means of preventing overflow of oil when the oil is first introduced into the refining chamber, the uppermost baffle member 20 is formed integral with the walls 18 and 26 adjacent one end thereof so as to form an open ended receiving chamber 29 and enables the oil introduced into the chamber 29 to assume a normal flow path over the surfaces of the baffle members or plates immediately it leaves the receiving chamber.

Means for heating the chamber 17 may take any suitable and practical form. Where motor vehicles are concerned it is convenient and economical to utilize the hot spent gases of combustion as they issue from the exhaust manifold. In the present instance therefore I disclose the heat chamber as being provided with pipe connections 30 and 31 respectively, the former being connected with the exhaust manifold or similar heat producing means and the latter communicating with the atmosphere. An inspection opening 32 is provided for the front wall of the refining chamber and is conveniently closed by a plate or cover member 33 which is retained in position by means of a winged or thumb nut 34. Suitable strap means such as is indicated at 35 are designed to embrace the oil filter B, the ends of the strap engaging the lugs or bosses 36 of the device A and maintain it in position on the filter.

With the modification of the oil refining device as disclosed in Figs. 7, 8 and 9, the heat chamber 17 is disposed immediately beneath the refining compartment or chamber 16. Inlet and outlet connections 30 and 31 deliver hot gases or other heating medium to and from the heat chamber while a short pipe or like connection 37 establishes communication between the oil filter B and the refining chamber 16 and not only permits filtered oil to flow into the refining or distillation chamber but enables volatile gases and vapors to pass from the refining chamber therethrough and through vent pipe 38 to the atmosphere.

The baffle means disclosed in Figs. 7 to 9 inclusive and designated by the numeral 39 is exemplified as being more specifically in step formation. As observed in Figs. 8 and 9, each step is arranged at an angle to the horizontal sufficient to cause oil thereon to flow lengthwise of the step or baffle, the steps of baffles being so merged with one another at their alternative ends that a tortuous flow path is provided between the inlet connection 37 and the outlet 25. Additionally, the baffle members or steps are also arranged at an angle to the horizontal in transverse section as seen in Fig. 8 so that oil thereon is guided in its longitudinal flow over the tortuous path of travel.

While the present invention operates effectively and efficiently as an independent unit, it tends to operate with a greater degree of efficiency where internal combustion engines are concerned since such engines invariably are provided with a conventional oil filter which removes grit, road dust, carbon and other solids carried in suspension in the oil prior to the oil being introduced into the refining or distillation chamber. It will be understood however that while filtration of the oil in the first instance is to be favored, it is not absolutely essential to the functioning of the present invention. For operative purposes however and to attain the most efficient results, I prefer to attach the refiner A to the side walls of the conventional oil filter B, the oil from the filter being introduced at the uppermost portion of the refining chamber while the outlet 25 leading therefrom may be attached to any appropriate part of the crank case or sump to complete the oil circulating system between the crank case, the oil filter and the oil refiner.

In operation, unrefined oil flowing from the oil filter B is conducted to the uppermost baffle members of the refining chamber 16 and commences its downward flow over the surfaces of the baffle or step members in an even and relatively thin film and progressively flows over the surface of each successive baffle member in a tortuous path of travel until it finally discharges through outlet 25 from whence it is returned to the crank case or sump in a refined condition. During the passage of oil over the baffle or step members, heat is introduced into the heat chamber by pipe means

30 and after having served its useful purpose is discharged to the atmosphere by way of outlet 31. By heating the chamber 17, heat is transmitted through the walls 18 and 19, the former serving to heat the refining chamber 16 which enables the volatile gases and vapors to be driven from the oil and the latter serving to heat the oil within the filter member and thus enables the filter to more properly perform its functions, particularly during cold weather.

During the operation of an internal combustion engine then a sufficiently high temperature is developed in the heat chamber 17 to insure the successful driving-off of the volatiles and vapors entrained in the oil yet within a temperature range that will not destroy the lubricating properties of the oil. As the oil progressively moves over its tortuous path of travel the gases and vapors therefrom travel upwardly from the surfaces of the baffle or step members and are carried to the atmosphere by way of suitable outlets, the refined oil, free of objectionable volatiles and vapors then flows through outlet 25 from whence it is returned to the crank case for recirculation.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or characteristics of the invention. The present disclosure is therefore to be considered in all respects as illustrative rather than restrictive as changes within the range of equivalency are intended to be embraced therein.

What I claim as my invention is:

1. In an oil refining device of the character described, a closed housing member provided with a dividing wall defining a refining chamber and a heating chamber therewithin, said dividing wall having the side thereof within the refining chamber formed in a series of longitudinally extending substantially flat surfaces inclined transversely toward the heat chamber and inclined longitudinally in substantially zigzagged formation with the lower end of one surface disposed substantially in line with the upper end of the next lower surface, an inlet connection for delivering unrefined liquids to the upper surface of the series, an outlet connection for discharging refined liquids from the lower end of the series of surfaces, a vent discharge opening from the refining chamber, and inlet and outlet connections for conducting a heat medium to and from the heat chamber to heat the dividing wall.

2. In an oil refining device of the character described, a closed housing member provided with a dividing wall defining a refining chamber and a heating chamber therewithin, said dividing wall having the side thereof within the refining chamber formed in a series of longitudinally extending substantially flat surfaces inclined transversely toward the heat chamber and inclined longitudinally in substantially zigzagged formation with the lower end of one surface disposed substantially in line with the upper end of the next lower surface, an inlet connection for delivering unrefined liquids to the upper surface of the series, an outlet connection for discharging refined liquids from the lower end of the series of surfaces, a vent discharge opening from the refining chamber, inlet and outlet connections for conducting a heat medium to and from the heat chamber to heat the dividing wall, said longitudinally extending substantially flat surfaces having the forward edges thereof open for overflow discharge of liquids, and a baffle at the liquid inlet opening directing the inlet liquids onto the upper flat surface.

3. In an oil refining device of the character described in combination with an oil filter, a closed housing member provided with a dividing wall defining a refining chamber and a heating chamber therewithin, said dividing wall having the side thereof within the refining chamber formed in a series of longitudinally extending substantially flat surfaces inclined transversely toward the heat chamber and inclined longitudinally in substantially zigzagged formation with the lower end of one surface disposed substantially in line with the upper end of the next lower surface, an inlet connection for delivering unrefined liquids to the upper surface of the series, an outlet connection for discharging refined liquids from the lower end of the series of surfaces, a vent discharge opening from the refining chamber, inlet and outlet connections for conducting a heat medium to and from the heat chamber to heat the dividing wall, said closed housing member having one side of the heat chamber portion thereof contoured to conform to and lie in heat exchange contact with the wall of the casing of an oil filter, and means holding the housing member in contact with the oil filter.

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