

## OIL PURIFIER SYSTEM AND PROCESS

### CROSS-REFERENCE TO RELATED APPLICATION

**[0001]** This application claims priority from co-pending application Ser. No. 10/647,093, filed Aug. 22, 2003 by DePaul, Publication No. 2005/0040077, entitled "LUBRICATING OIL RECONDITIONING DEVICE AND PROCESS," which is hereby incorporated by reference in its entirety for all that it teaches without exclusion of any part thereof.

### FIELD OF THE INVENTION

**[0002]** The present invention relates generally to oil reconditioning systems and processes. More specifically, the invention relates to an improved oil reconditioning system and method in which contaminated oil is deposited on an evaporation surface and volatile contaminants are separated from the oil.

### BACKGROUND OF THE INVENTION

**[0003]** Commonly used oil filters for internal combustion engines generally do not remove miscible liquid contaminants from the oil. Such contaminants include, but are not limited to, water and low boiling point organic chemicals whose presence in the lubricating oil may cause engine corrosion and wear.

**[0004]** Oil lubricating systems for internal combustion engines that may remove such contaminants are described in U.S. Pat. Nos. 5,242,034, 5,707,515 and No. 6,083,406, each to Frank and/or Michael DePaul. Each of these patents are entirely incorporated herein by reference. Although these patents disclose oil reconditioning systems which are both functional and effective, new systems and methods would be desirable to improve efficiency and reliability.

### DEFINITION OF CLAIM TERMS

**[0005]** The following terms are used in the claims of the patent as filed and are intended to have their broadest meaning consistent with the requirements of law. Where alternative meanings are possible, the broadest meaning is intended. All words used in the claims are intended to be used in the normal, customary usage of grammar and the English language.

**[0006]** "Approximately atmospheric pressure" means a pressure within the housing of the oil reconditioning system which is retained at a sufficiently low pressure in comparison to the pressurized oil stream initially supplied to the housing that the pressure in the housing does not substantially interfere with the formation of a mist from the oil stream when the oil stream is discharged from the oil distributor.

**[0007]** "Contaminants" means any particles or chemicals whose presence in the oil stream may be detrimental to the operation of the engine, such as but not limited to water, non-oil particles, sludge, fuel, and low boiling point volatiles.

**[0008]** "Mist" means a cloudlike aggregation of minute globules of liquids and particles, such as oil, water, and contaminants, suspended in air while moving from the oil distributor to the evaporation surface.

**[0009]** "Evaporation surface" means any surface configured to receive the oil stream at or near an upper portion of the surface and configured to allow the oil to flow in a film

toward a lower portion of the surface, and being capable of passing heat to the film from a heat source in contact with or near the surface.

### SUMMARY OF THE INVENTION

**[0010]** The present invention provides a system and method for refining oil. In one preferred system, an oil purifier for an internal combustion engine may be provided for separating contaminants in an oil stream from the oil. The system may include a housing, an oil distributor, and a heating element. The housing may enclose a platen having an evaporation surface. The oil distributor may also be located in the housing and may be configured to receive an incoming oil stream. The oil distributor may have a discharge manifold for transforming the oil stream into a mist. The mist may be directed toward, and distributed over, at least a portion of the evaporation surface. The heating element may be in thermal communication with the platen. The evaporation surface may be heated to a temperature sufficient to volatilize the contaminants, resulting in a purified liquid oil which may be collected and reused with the engine.

**[0011]** In an additional preferred embodiment, the heating element is in physical contact with the platen. In an additional embodiment, the evaporation surface includes an upper portion which receives the oil mist and upon which the oil forms a film, and a lower portion which receives the oil film flowing toward it under the influence of gravity and from which the purified liquid oil is collected.

**[0012]** In an additional preferred embodiment, the evaporation surface includes an inverse substantially conical shape having a plurality of substantially planar downwardly sloping sides. In an additional preferred embodiment, the evaporation surface lacks horizontal surfaces between the upper portion and the lower portion. In an additional preferred embodiment, the primarily planar side portions include horizontal grooves. In an additional preferred embodiment, the plurality of substantially planar side portions converge at transition points, and at least one of the transition points is rounded.

**[0013]** In an additional preferred embodiment, the contaminants are discharged to the atmosphere and/or to the engine manifold. In an additional preferred embodiment, the liquid oil is collected and returned to an oil fill associated with the engine. In an additional preferred embodiment, a gap is provided between the platen and a bottom plate of the housing, and the liquid oil is collected on the bottom plate. In an additional preferred embodiment, the platen extends to a bottom plate of the housing, thereby separating the housing into an inner chamber and an outer chamber, and the liquid oil remains in the inner chamber.

**[0014]** In an additional preferred additional embodiment, the oil purifier also includes a metering jet for regulating the oil stream prior to the oil stream being introduced to the oil distributor.

**[0015]** In an additional preferred additional embodiment, the oil purifier also includes a three-stage filter configured to remove particles greater than three microns from the oil stream prior to the oil stream being introduced to the oil distributor.

**[0016]** In an additional preferred additional embodiment, the housing is maintained at approximately atmospheric pressure and the distributor is configured to receive the oil stream at greater than atmospheric pressure.