

such slope variations are employed than when evaporation surface **214a** is uniformly sloped.

**[0043]** Volatile contaminants separated from the bypass oil stream enter inner chamber **208** and collect over platen **214** and beneath top plate **206**. Conveniently and preferably, vapors collecting in inner chamber **208** are released through valve **202**. In one embodiment, valve **208** includes a check valve portion to prevent loss of oil from purifier chamber **208** in the event of a blockage or hindrance of the bypass oil stream.

**[0044]** An electric resistance heating element **61** may be circumferentially extended around platen **214** and may be separated from inner chamber **208** by evaporation surface **214**. Heating element **61** may be connected to an electrical plug type connector **62** that is associated with, and extends through, a location in side walls **53**. Exteriorly relative to lower housing **52**, plug type connector **62** may be conventionally connected to an electric power supply line **64**. Heating element **61** may preferably be provided with a thermostatic temperature regulating means (not shown) so that at least a portion of evaporation surface **214a** may be maintained at an elevated temperature. Preferably, heating element **61** is operated by a 12-volt battery, or other conventional power battery system, associated with a vehicle in which oil purifier **102** is being used. Since heating element **61** and its associated components are located on the opposite side of platen **214** from evaporation surface **214a**, they may be isolated from inner chamber **208** and fluids (including oil and volatiles) therein.

**[0045]** As shown in FIG. 1, in one embodiment the bypass oil stream is filtered by filter **106** before being charged to purifier chamber **108**. Filtering may be accomplished by a conventional filter and filter arrangements. More preferably, filtering may be accomplished through filters described in DePaul U.S. Pat. No. 6,083,406. In one preferred embodiment, a 3-stage filter **106** is employed. 3-stage filter **106** may include a first-exterior stage filter configured to filter contaminants between about 25-40 microns, a second-intermediate stage filter configured to filter contaminants between about 10-25 microns, and a third-internal stage filter configured to filter contaminants between about 3-10 microns. Filter **106** may employ an external-to-internal flow pattern such that larger particles are captured in the first-exterior and second-exterior stages, and smaller particles are captured in the third-interior stage. In one embodiment, an expanded third-interior stage is believed to provide more complete filtration and result in longer filter life.

**[0046]** In one embodiment, the bypass oil stream may flow at rate of about 4-to-6 gallons per hour at a pressure in the range of about 20 to about 100 psi, and preferably in the range of about 40 to about 75 psi. Preferably during the filtering, particulates having particle sizes over about 3 microns are removed. It is believed that substantially all volatile contaminants may be removed from the oil in an engine that employs the invention.

**[0047]** In one method of practicing the invention, a first step includes charging the pressurized and filtered bypass oil stream through spray nozzle **210** into inner chamber **208**. Pressure in inner chamber **208** is preferably maintained at approximately atmospheric pressure through vent **202**. Passing the pressurized and filtered bypass oil stream through spray nozzle **210** depressurizes the bypass oil stream, reduces its pressure to approximately atmospheric pressure, and generally permits the bypass oil stream to form a mist.

In upper chamber **208**, the oil is moved to upper portion **214b** of evaporation surface **214a**, where the oil generally forms a film on evaporation surface **214a**. The film generally flows from upper portion **214b** to lower portion **214c**. Contaminants in the bypass oil stream may be volatilized through the misting process and/or through evaporation from evaporation surface **214a**. The purified oil bypass stream may then be introduced to conduit **36**.

**[0048]** In one embodiment, at least a portion of evaporation surface **214a** is heated to a temperature in the range of from about 150-210° F., and more preferably about 160-200° F., although higher and lower temperatures may be used, if desired.

**[0049]** Those skilled in the art will readily appreciate that, particularly in the case of relatively small vehicular engines, oil purifier **102** may sometimes be employed as a replacement or alternative for a conventional oil filter assembly, such as replaceable oil filter **28**, or the like.

**[0050]** In place of evaporation platen **214a** having the shape illustrated in FIG. 1, various alternatively shaped platens may be used in various embodiments of the invention. Some of those alternative shapes are illustrated in U.S. Published Patent Application No. 2005/0040077. An alternatively shaped platen **302** is also illustrated in FIG. 3. Platen **302** may include an evaporation surface **302a** having an upper portion **302b**, a lower portion **302c**, a plurality of downward-sloped surfaces **302d**, an outturned flange **302e**, and horizontal grooves **302f**. The convergence of the downward sloped surfaces may have rounded edges **302g** from upper portion **302b** to lower portion **302c**.

**[0051]** Another preferred method of practicing the invention is further illustrated in FIG. 4. FIG. 4 shows a method **400** of separating contaminants from an oil stream associated with an internal combustion engine. The method **400** may include a step **402** in which a contaminated oil stream is introduced to the purifier chamber **108**. In step **404**, the contaminated oil stream may be regulated through a metering jet **209**. In step **406**, the contaminated oil stream may be transformed into a mist, for example, by introducing the oil stream to an oil distributor such as spray nozzle **210**. Various steps during the process, such as in step **406**, may result in contaminants being separated from the oil stream. In step **408**, contaminants may be discharged, for example, through conduit **37**.

**[0052]** In step **410**, the mist may be distributed over an upper portion of an evaporation surface located in a housing, where the oil may flow from the upper portion to a lower portion. For example, the mist may be distributed over upper portion **214b** of evaporation surface **214** located in housing **52**. In step **412**, the evaporation surface may be heated. For example, heating element **61** may be used to heat evaporation surface **214**. In step **414**, the oil may flow from an upper portion of the evaporation surface to a lower portion. For example, the oil may flow from upper portion **214b** to lower portion **214c**. In addition to step **406**, steps **410** to **414** may also result in contaminants being separated from the oil stream. In step **416**, the purified oil may be collected and reintroduced to the engine. For example, the purified oil may be collected on bottom plate **54** and returned to the engine through conduit **36**.

**[0053]** Where processes and methods are described, it is not contemplated that the steps of the method are necessarily required to be performed in the order in which they are described. The above description is not intended to limit the