APPARATUS AND METHOD

This invention relates to a device for a vehicle which may be coupled to a fluid system such as a fluid container. This invention also relates to associated modular unit, apparatus and vehicle. This invention also relates to a method for determining a property of a fluid in a fluid system such as a fluid container.

Many vehicle engines use one or more fluids for their operation. Such fluids are often liquids. For example, internal combustion engines use liquid lubricating oil. Also, electric engines use fluids which can provide heat exchange functionality, for example to cool the engine and/or to heat the engine, and/or to cool and heat the engine during different operating conditions. The heat exchange functionality of the fluids may be provided in addition to other functions (such as a primary function) which may include for example charge conduction and/or electrical connectivity. Such fluids are generally held in reservoirs associated with the engine and may require periodic replacement.

Such fluids often are consumed during operation of the engine. The properties of such fluids may also degrade with time so that their performance deteriorates, resulting in a need for replacement with fresh fluid. Such replacement may be an involved and time-consuming process. For example, replacement of engine lubricating oil in a vehicle engine usually involves draining the lubricating oil from the engine sump. The process may also involve removing and replacing the engine oil filter. Such a procedure usually requires access to the engine sump drain plug and oil filter from the underside of the engine, may require the use of hand tools and usually requires a suitable collection method for the drained lubricating oil.

Aspects and embodiments of the present disclosure are directed to a device for a vehicle which may be coupled to a fluid system such as a fluid container. Aspects and embodiments of the present disclosure are directed to a modular unit, to an apparatus and to a vehicle. Aspects and embodiments of the present disclosure are directed to a determination of a property of a fluid in a replaceable fluid container.

Aspects of the invention are recited in the independent claims and preferred features are recited in the dependent claims.

Summary

The present disclosure is directed to a device for a vehicle, comprising:

a first interface configured to couple to at least one replaceable fluid container for a vehicle comprising a battery,

the first interface comprising at least one fluid port configured to couple to at least one fluid port of the replaceable fluid container;

a second interface configured to couple to an engine of the vehicle,

the second interface comprising at least one fluid port configured to couple to at least one fluid port of a fluid circulation system of the vehicle;

a fluid path coupled to at least one fluid port of the first interface and at least one fluid port of the second interface; and

at least one electrical pump configured to be powered and/or driven by the battery of the vehicle and to cause fluid flow between the replaceable fluid container and the fluid circulation system through the fluid path.

The present disclosure is also directed to a modular unit for coupling at least one replaceable fluid container to a vehicle comprising a battery to an engine of the vehicle, the modular unit comprising:

a fluid path coupleable to at least one fluid port of the replaceable fluid container and at least one fluid port of a fluid circulation system of the vehicle; and

at least one electrical pump configured to be powered and/or driven by the battery of the vehicle and to cause fluid flow between the replaceable fluid container and the fluid circulation system through the fluid path.

The present disclosure is further directed to an apparatus or a vehicle comprising a battery, comprising: the device or the modular unit as disclosed herein, and optionally further comprising at least one replaceable fluid container for a vehicle.

In one aspect, the present disclosure is directed to a method of determining a characteristic associated with a fluid in a replaceable fluid container for a vehicle comprising a fluid circulation system, the method comprising:

determining a temperature associated with the fluid in the replaceable fluid container;

wherein the replaceable fluid container is coupled to a fluid path coupled to the fluid circulation system, and

wherein at least one electrical pump is configured to be powered and/or driven by a battery of the vehicle and to cause fluid flow between the replaceable fluid container and the fluid circulation system through the fluid path;

determining an electrical load associated with the electrical pump in a predetermined mode of operation; and

comparing the determined electrical load with at least one expected electrical load associated with the determined temperature and the predetermined mode of operation, to provide a measure of the characteristic of the fluid.

Detailed Disclosure of Embodiments

Some embodiments will now be described, by way of example only, with reference to the accompanying drawings, in which:

Claims

1. A method of determining a characteristic associated with a fluid in a replaceable fluid container for a vehicle comprising a fluid circulation system, the method comprising:

determining a temperature associated with the fluid in the replaceable fluid container;

wherein the replaceable fluid container is coupled to a fluid path coupled to the fluid circulation system, and

wherein at least one electrical pump is configured to be powered and/or driven by a battery of the vehicle and to cause fluid flow between the replaceable fluid container and the fluid circulation system through the fluid path;

determining an electrical load associated with the electrical pump in a predetermined mode of operation; and

comparing the determined electrical load with at least one expected electrical load associated with the determined temperature and the predetermined mode of operation, to provide a measure of the characteristic of the fluid.

2. The method of claim 1, wherein the characteristic comprises at least one of a viscosity of the fluid, an age of the fluid, and a purity of the fluid.

3. The method of claim 1 or 2 further comprising: providing data or an indication that the viscosity of the fluid and/or the age of the fluid are above a predetermined threshold, when the comparing comprises determining that the determined electrical load is greater than the expected electrical load associated with the determined temperature and the predetermined mode of operation.

4. The method of claim 3 further comprising providing data indicating that a fluid change is required.

5. The method of any preceding claims further comprising: providing data or an indication that the viscosity of the fluid and/or the purity of the fluid are below a predetermined threshold, when the comparing comprises determining that the determined electrical load is lower than the expected electrical load associated with the determined temperature and the predetermined mode of operation.

6. The method of any preceding claims further comprising: providing data or an indication indicating that a running of an engine of the vehicle at a predetermined power output is required.

7. The method of any preceding claims wherein determining the temperature comprises using data from one or more temperature sensors associated with:

the replaceable container, and/or

the vehicle, and/or

the device, and/or

the modular unit.

8. The method of any preceding claims wherein the fluid in the container is one or more of:

a lubricating oil,

a de-icer,

a hydraulic fluid,

a pneumatic fluid,

a washer fluid,

a fuel additive,

a charge conduction liquid,

an electrical connectivity liquid, and

a heat exchange fluid.