A SYSTEM AND METHOD FOR HEATING LIQUIDS IN A VEHICLE

FIELD OF INVENTION

The present invention relates to the field of heating liquids in vehicles.

BACKGROUND

Large scale washing of dishes and cutlery efficiently in vehicles is difficult. Typically, issues arise due to difficulties in relation to operating of automatic dishwashers installed in vehicles. This has led to a situation where disposable dishes and cutlery are used, which leads to generation of substantial amounts of waste. Such a practice is also not beneficial to the environment.

Generally, using heated water to wash dishes and cutlery is desirable as some components of dishwashing detergent are more soluble at higher temperatures, and furthermore, the heat aids in melting fat and grease found on the dishes and cutlery. Moreover, using heated water also aids in eliminating some bacteria which is advantageous from a hygiene/sterilisation perspective.

Being able to operate dishwashers in a desirable manner in vehicles is currently not readily resolvable. Several aspects will need to be resolved before the problem can be solved.

SUMMARY

In a first aspect, there is provided a system for heating liquids in a vehicle, the system comprising:

a piping for passage of exhaust gases from an engine;

a container encasing a portion of the piping; and

a plurality of cooling fins located along the piping, the cooling fins being configured to transfer heat from the piping to an enclosure defined by the container.

In a second aspect, there is provided a method for heating liquids in a vehicle, the method comprising:

passing exhaust gases from a vehicular engine through a piping;

drawing heat from the piping; and

transferring heat energy from the piping via cooling fins.

In a third aspect, there is provided a system for heating liquids in a vehicle, the system comprising:

a heater for pre-heating the liquids to a pre-determined temperature;

at least one dishwasher, the dishwasher being provided with the pre-heated liquids; and

a power generator for the at least one dishwasher, the power generator being sufficient to operate the at least one dishwasher at a desired operating temperature.

In a final aspect, there is provided a method for heating liquids in a vehicle, the method comprising:

heating the liquid to a pre-determined temperature;

feeding the pre-heated liquid to at least one dishwasher; and

operating the at least one dishwasher at respective desired operating temperatures.

It will be appreciated that the broad forms of the invention and their respective features can be used in conjunction, interchangeably and/or independently, and reference to separate broad forms is not intended to be limiting.

DESCRIPTION OF FIGURES

A non-limiting example of the present invention will now be described with reference to the accompanying drawings, in which: -

FIG 1 is a schematic diagram of a first example of a system for heating liquids;
FIG 2 is a flow chart of a method for heating liquids using the first example system;
FIG 3 is a schematic diagram of a second example of a system for heating liquids;
FIG 4 is a flow chart of a method for heating liquids using the second example system; and
FIG 5 is an example of a vehicle deploying the system of FIG 1.

DETAILED DESCRIPTION

Embodiments of the present invention provide users with a system and method for heating fluids in a vehicle. The system and method allow users to operate a vehicle-based dish washing facility which is able to utilise heated water. The system and method allow the vehicle-based dish washing facility to be deployed at desired/required locations, and does not require secondary power sources (and corresponding costs) to power the vehicle-based dish washing facility.

A first example of a system 100 for heating liquids in a vehicle will now be described with reference to FIG 1. The system 100 is incorporated with or within a vehicle so that the system 100 is mobile.

The system 100 includes a diesel heater 105 which is located along a water channel 120, the water channel 120 being for water used for washing dishes. A flow meter and pump can be located along the water channel 120 to control the flow rate of the water. The water source can be on the vehicle, but this can be dependent on a location of deployment of the vehicle. The diesel heater 105 can draw fuel from a fuel tank of the vehicle such that a separate fuel source is not

required for the diesel heater 105. The diesel heater 105 then heats the water before the water is fed to, and used in a primary dishwasher 110.

The primary dishwasher 110 can have a plurality of heating elements. However, since the diesel heater 105 is able to heat water to a pre-determined temperature, for example, around 80^0C, only a minimal number of heating elements of the primary dishwasher 110 needs to be powered by a power generator 115 in order to heat the water to a desired operating temperature of between 80^0C and 85^0C, preferably 82^0C. This minimises the power drawn from the power generator 115, and correspondingly, a smaller (both in size and power rating) power generator 115 can be used for the system 100. In some embodiments, the power generator 115 can be powered when an engine of a vehicle that the system 100 is incorporated with is running. In some embodiments, the power generator 115 is powered independently from the engine of the vehicle that the system 100 is incorporated with.

Furthermore, the power generator 115 can also have excess capacity to power a secondary dishwasher 120. The secondary dishwasher 120 is typically smaller (both in size and capacity) than the primary dishwasher 110. The secondary dishwasher 120 can be a back-up to the primary dishwasher 110, or alternatively, the secondary dishwasher 120 can be used simultaneously with the primary dishwasher 110 if dishes need to be washed separately, for example, for religious reasons, due to varying fragility of dishes and so forth.

It should be appreciated that the system 100 allows a supply of water to be heated for use subsequently for washing of dishes. The system 100 relies on pre-heating the supply of water such that power consumption by the primary 110 and secondary 120 dishwashers is minimised. The system 100 allows users to operate a vehicle-based dish washing facility. The system 100 allows the vehicle-based dish washing facility to be deployed at desired/required locations, and does not

require secondary power sources (and corresponding costs) to power the vehicle-based dish washing facility.

Referring to FIG 5, there is provided an example of a vehicle 500 deploying the system 100. The vehicle 500 is shown in an operational state. Typically, the vehicle 500 is capable of hauling large loads, and includes a washing module 505, whereby the system 100 is deployed within the washing module 505. Two views, a front perspective and a rear perspective, of the washing module 505 are provided, and it should be noted that the washing module 505 includes an integrated power and water supply. By having the integrated power and water supply, the vehicle 500 is able to obtain Hazard Analysis and Critical Control Points (HACCP) certification, as the integrated water supply can be heated to a desired temperature so that cleaning and sterilization of dishes can be carried out. Furthermore, the washing module 505 is also able to contain waste water in a rear container 510, and this ensures that the vehicle 500 does not have to dispose the waste water at any deployment location. The washing module 505 also includes entrances/exits to allow dishes to be brought into and out of the washing module 505.

Referring to FIG 2, there is provided a first example of a method 200 for heating liquids in a vehicle. It should be appreciated that the method 200 can be carried out using the aforementioned vehicle mounted system 100, as well as other set-ups.

The method 200 comprises step 205, where a diesel heater located along a water channel heats water to a pre-determined temperature of around 80^0C. The diesel heater can draw fuel from a fuel tank of a vehicle such that a separate fuel source is not required for the diesel heater.

At step 210, the pre-heated water is fed to at least one dishwasher. Given that the water is pre-heated, the at least one dishwasher uses less power in order to heat

the water to a desired operating temperature of between 80^0C and 85^0C, preferable 82^0C. This minimises the power drawn from the power generator for the at least one dishwasher, and correspondingly, a smaller (both in size and power rating) power generator can be used. In some embodiments, the power generator can be powered by an engine of a vehicle.

At step 215, the at least one dishwasher is operated at respective desired operating temperatures, for example, between 80^0C and 85^0C, preferably 82^0C. For example, one dishwasher is not sufficient when dishes need to be washed separately, for example, for religious reasons, due to varying fragility of dishes and so forth. It should be appreciated that the power generator is able to power multiple dishwashers if necessary, because the pre-heating of the water ensures that the power generator is able to minimise power required to operate the multiple dishwashers.

It should be appreciated that the method 200 allows a supply of water to be heated for use subsequently for washing of dishes. The method 200 relies on pre-heating the supply of water such that power consumption by at least one dishwasher is minimised. The method 200 allows users to operate a vehicle-based dish washing facility. The method 200 allows the vehicle-based dish washing facility to be deployed at desired/required locations, and does not require secondary power sources (and corresponding costs) to power the vehicle-based dish washing facility.

A second example of a system 300 for heating liquids in a vehicle will now be described with reference to FIG 3. For the purpose of illustration, an engine of the vehicle can be configured to enable motion of the vehicle, or can be a secondary engine located on the vehicle configured for a secondary function.

In this example, the system 300 comprises a piping 302 for passage of exhaust gases from an engine 304. In some embodiments, the piping 302 is part of a

vehicular engine cooling assembly and can be made from steel. The engine 304 is an internal combustion engine which can be configured to enable motion of the vehicle or can be a secondary engine configured for a secondary function. Typically, the engine should be a diesel engine, as substantial torque is required to provide propulsion for the vehicle containing the system 300.

A portion 308 of the piping 302 is encased within a container 310. In some embodiments, the portion 308 of the piping 302 is in a helical configuration. The container 310 defines an enclosure 306. The container 310 is typically metallic, and is insulated to minimise heat loss from the external surface of the container 310.

In some embodiments, the container 310 can include at least one inlet 312 and at least one outlet 314. The at least one inlet 312 and at least one outlet 314 are connected to a liquid source, the liquid preferably being water, whereby the water is heated up in the container 310 and subsequently utilised for washing of dishes. The liquid source can be on the vehicle, but this can be dependent on a location of deployment of the vehicle. For example, if the vehicle is deployed at a location where there is no water source, the vehicle is then required to transport the water for use by the system 300. Either the at least one inlet 312 or the at least one outlet 314 can be coupled to a flow regulator 316, so as to control a flow rate of water passing through the container 310. The flow regulator 316 can be a pump device or similar.

A plurality of cooling fins 311 is located at the portion 308 of the piping 302 within the container 310. The cooling fins 311 are configured to transfer heat from the piping 302 to the enclosure 306. In some embodiments, at least one thermometer 318 is also located in the enclosure. The at least one thermometer is configured to determine a temperature of water stored in the enclosure 306. Furthermore, either the at least one inlet 312 or the at least one outlet 314 can be coupled to a flow

meter 320, so as to determine the flow rate of water passing through the container 310.

In some embodiments, the system 300 can be mounted to an undercarriage of the vehicle, as per a typical location for vehicular engine cooling assemblies (exhaust systems) for vehicles. However, the system 300 can also be located at other positions of a vehicle, for example, for aesthetics reasons, for design reasons like to enhance liquid flow pressure, and so forth.

It should be appreciated that the system 300 allows a supply of water to be heated for use subsequently for washing of dishes. The system 300 relies on drawing heat from a vehicular engine cooling assembly to heat the supply of water. The system 300 allows users to operate a vehicle-based dish washing facility which can be deployed at desired/required locations, and does not require secondary power sources (and corresponding costs) to power the vehicle-based dish washing facility. In addition, running the system 300 only involves running an engine of the vehicle, regardless of whether the vehicle is in motion or stationary.

Referring to FIG 4, there is provided a second example of a method 400 for heating liquids in a vehicle. It should be appreciated that the method 400 can be carried out using the aforementioned system 300, as well as other set-ups.

The method 400 comprises step 405, where exhaust gases from the vehicular engine are passed through a piping. The piping for passage of the exhaust is part of a vehicular engine cooling assembly and can be made from steel. The engine is an internal combustion engine which can be configured to enable motion of the vehicle or can be a secondary engine configured for a secondary function.

At step 410, heat is drawn from the piping to an enclosure defined by a container encasing a portion of the piping. In some embodiments, the portion of the piping is

in a helical configuration. The container is typically insulated and is insulated to minimise heat loss from the external surface of the container.

In some embodiments, the container can include at least one inlet and at least one outlet. The at least one inlet and at least one outlet are connected to a liquid source, the liquid preferably being water, whereby the water is heated up in the container and subsequently utilised for washing of dishes. The liquid source can be on the vehicle, but this can be dependent on a location of deployment of the vehicle. Either the at least one inlet or the at least one outlet can be coupled to a flow regulator, so as to control a flow rate of water passing through the container. The flow regulator can be a pump device or similar.

Subsequently, at step 415, heat energy from the piping is transferred to the enclosure via a plurality of cooling fins located at the portion of the piping. And at step 420, a rate of liquid flow from the at least one outlet is regulated using the flow regulator.

It should be appreciated that the method 400 allows a supply of water to be heated for use subsequently for washing of dishes. The method 400 relies on drawing heat from a vehicular engine cooling assembly to heat the supply of water. The method 400 allows users to operate a vehicle-based dish washing facility and allows the vehicle-based dish washing facility to be deployed at desired/required locations, and does not require secondary power sources (and corresponding costs) to power the vehicle-based dish washing facility. In addition, running the method 400 only involves running an engine of the vehicle, regardless of whether the vehicle is in motion or stationary.

Throughout this specification and claims which follow, unless the context requires otherwise, the word “comprise”, and variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated integer or group of integers or steps but not the exclusion of any other integer or group of integers.

Persons skilled in the art will appreciate that numerous variations and modifications will become apparent. All such variations and modifications which become apparent to persons skilled in the art, should be considered to fall within the spirit and scope that the invention broadly appearing before described.

CLAIMS

1. A system for heating liquids in a vehicle, the system comprising:
   a piping for passage of exhaust gases from an engine;
   a container encasing a portion of the piping; and
   a plurality of cooling fins located along the piping, the cooling fins being configured to transfer heat from the piping to an enclosure defined by the container.

2. The system of claim 1, wherein the piping is made from steel.

3. The system of either claim 1 or 2, wherein an external surface of the container is insulated to minimise heat loss from the external surface.

4. The system of any of claims 1 to 3, wherein the portion of the piping is in a helical configuration.

5. The system of any of claims 1 to 4, wherein the container includes at least one inlet and at least one outlet.

6. The system of claim 5, further including a flow regulator for coupling to the at least one inlet or the at least one outlet.

7. The system of any one of claims 1 to 6, further including at least one thermometer located in the enclosure.

8. The system of any one of claims 1 to 7, further including at least one flow meter to determine a flow of liquid from the container.

9. The system of any one of claims 1 to 8 being mounted to an undercarriage of the vehicle.

10. A method for heating liquids in a vehicle, the method comprising:
passing exhaust gases from a vehicular engine through a piping;
drawing heat from the piping; and
transferring heat energy from the piping via cooling fins.

11. The method of claim 10, wherein the heat energy is transferred using cooling fins located along the piping.

12. The method of either claim 10 or 11, wherein the piping is encased in a container, the container including at least one inlet and at least one outlet.

13. The method of claim 12, further including regulating a rate of liquid flow from the at least one outlet.

14. A system for heating liquids in a vehicle, the system comprising:
a heater for pre-heating the liquids to a pre-determined temperature;
at least one dishwasher, the dishwasher being provided with the pre-heated liquids; and
a power generator for the at least one dishwasher, the power generator being sufficient to operate the at least one dishwasher at a desired operating temperature.

15. The system of claim 14, wherein the pre-determined temperature is 80^0C.

16. The system of either claim 14 or 15, wherein the desired operating temperature is between 80^0C and 85^0C.

17. A method for heating liquids in a vehicle, the method comprising:
heating the liquid to a pre-determined temperature;
feeding the pre-heated liquid to at least one dishwasher; and
operating the at least one dishwasher at respective desired operating

temperatures.

18. The method of claim 17, wherein the pre-determined temperature is 80^0C.

19. The method of either claim 17 or 18, wherein the desired operating temperature is between 80^0C and 85^0C.