

A DECARBONIZATION SYSTEM

TECHNICAL FIELD

This invention relates generally to a method and a system for monitoring activities in
5 defined areas.

Background

The gasoline in car engines may contain high levels of olefin; with the innate high
temperature within the engine, the gasification of the gasoline contents will result in the
10 oxidisation of the olefin. This results in the formation of a type of gum that stays on the
intake valve, fuel injectors and piston parts, which will lead to decrease in performance, or
even damage to the engine over time.

In a car's engine, combustion is never perfect. Engines, to a varying degree, are susceptible
15 to carbon build-up in various areas. This build-up of carbon deposits has a negative impact
on the engine's performance and efficiency, and might also cause damage to engine
components as mileage increases. An internal combustion engine burns fuel (hydrocarbons)
to provide the force needed to drive the car. This process however, is not "perfect" (where
all of the fuel and air has fully reacted with each other, leaving behind carbon dioxide, water
20 and nitrogen), and will leave behind unburned hydrocarbons as well, which will overtime,
collect as a deposit within the cylinder. This deposit can collect on the piston head, the
engine valves, throttle body and fuel injector. It is necessary for car owners to do carbon
cleaning as carbon extensively affects the efficiency of the engines and lessens the airflow,
and when accumulated, it will weaken car's performance.

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Existing approaches to cleaning the car engines require multiple technicians to work on a
single car engine. A first technician will be directing cleaning liquids from a canister into
the car engine while a second technician is needed to be seated in the driver's seat of the car
for regulating the crank revolution rate/RPM of the engine. Firstly, this is inefficient use of
30 manpower. Secondly, it is very difficult for the first technician to accurately control a

controllable discharge outlet of the pressurised canister to control discharge amount, duration and frequency of the cleaning liquid into the car engine. Thirdly, over-discharge of the cleaning liquid from the pressurised canister into the car engine may cause the car engine to stall during cleaning thereof. Therefore, there exists a need for an improved engine decarbonization system for addressing the foregoing problems.

Summary

In accordance with a first aspect of the invention, there is disclosed a decarbonisation system comprising a container defining an enclosure for containing liquids and a first inlet and a first outlet to the enclosure, a first valve coupled to the first inlet and adapted for intercoupling an air supply and the container, the first valve being operable for one of substantially impeding and enabling passage of pressurized air from the air supply to the container and a second valve coupled to the first outlet. The decarbonization system further comprises a delivery unit having two ends forming extremities thereof, and a nozzle coupled to one end of the delivery unit with the other end thereof being coupled to the second valve for interposing the second valve between the container and the delivery unit. The second valve is operable for one of substantially impeding and enabling passage of liquid from the container to the delivery unit with the delivery unit being adapted for being retained at and positioning the nozzle at least one of within and towards the intake manifold of an engine. The decarbonization system further comprises a controller in signal communication with the first valve and second valve for controlling operation thereof. The controller has predefined a plurality of routines with each of the plurality of routines indicative of at least one of a routine duration, spray pattern, at least one spray pulse duration and at least one duration between spray pulses. The controller having a plurality of modes comprising a STOP mode wherein the first valve is operated to impede flow of compressed air into the container via the first inlet and the second valve is operated to impede flow of the liquid from the container to the delivery unit, and a PLAY mode wherein the first valve is operated to enable flow of compressed air into the container via the first inlet for pressurizing the container and the second valve is operated to enable flow of the liquid from the pressurized container to the delivery unit, the flow of the liquid into the delivery unit being controlled by

the controller based on one of the plurality of routines. The nozzle is shaped and dimensioned for atomising the liquid exiting the delivery unit into an atomized mist for being directed into the intake manifold of the engine for decarbonisation thereof.

- 5 In accordance with a second aspect of the invention, there is disclosed a decarbonisation method comprising coupling a container to an air supply for receiving pressurized air therefrom. The container defines an enclosure for containing liquids, a first inlet to the container wherewith a first valve couples and a first outlet to the container wherewith a second valve couples. The first valve inter-couples the air supply and the container and is
- 10 operable for one of substantially impeding and enabling passage of pressurized air from the air supply to the container. The decarbonization method further comprises configuring a delivery unit with an engine to thereby position a nozzle coupled to one of two extremities thereof at least one of within and towards the intake manifold of an engine with the other of the two extremities of the delivery unit being coupled to the second valve for interposing the
- 15 second valve between the container and the delivery unit. The second valve is operable for one of substantially impeding and enabling passage of liquid from the container to the delivery unit, a controller in signal communication with the first valve and second vale for controlling operation thereof. The decarbonization method further comprises initiating one of a plurality of routines predefined with the controller, each of the plurality of routines
- 20 being indicative of at least one of a routine duration, spray pattern, at least one spray pulse duration and at least one duration between spray pulses, the one of the plurality of routines being initiated by operating the first valve to enable flow of compressed air into the container via the first inlet for pressurizing the container and operating the second valve to enable flow of the liquid from the pressurized container to the delivery unit with the flow of
- 25 the liquid into the delivery unit being controlled by the controller based on one of the plurality of routines. The nozzle is shaped and dimensioned for atomising the liquid exiting the delivery unit into an atomized mist for being directed into the intake manifold of the engine for decarbonisation thereof. The initiated one of the plurality of routine is one of terminated and completed by operating the first valve to impede flow of compressed air into

the container via the first inlet and operating the second valve to impede flow of the liquid from the container to the delivery unit.

5 **Brief Description of the Drawings**

FIG. 1 shows an exemplary partial front sectional view of a decarbonization system in accordance with an aspect of the invention for use with an engine;

10 FIG. 2 shows a partial front sectional view of the distribution unit of the decarbonization system of FIG. 1 coupled with an intake manifold of an engine for disposing a nozzle in an air passage thereof;

FIG. 3 shows a system flow diagram of a controller of the decarbonization system of FIG. 1;

15 FIG. 4 illustrates an exemplary pulse spray pattern of atomized fluid dischargable from the nozzle of FIG. 2 based on one of a plurality of routines definable by the controller of FIG. 3;

FIG. 5 shows a process flow diagram of a decarbonization method according to an aspect of the invention and utilized by the decarbonization system of FIG. 1; and

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FIG. 6 shows the decarbonization system of FIG. 1 adapted with a distribution manifold for use with multiple engines.

Detailed Description

An exemplary embodiment of the present invention, a decarbonization system 20 utilising a decarbonization method 100, is described hereinafter with reference to FIG. 1 and FIG. 6.

5 The decarbonization system 20 is preferably for use for decarbonizing an engine 22.

Preferably, the decarbonization system 20 comprises a container 24 defining an enclosure 26 for containing liquids 28. The decarbonization system 20 further comprises a first valve 30 and a second valve 32, with the container 24 defining a first inlet 34 and a first outlet 36 to
10 the enclosure 26. The first valve 30 couples to the first inlet 34 and is adapted for intercoupling an air supply 38 and the container 24. The first valve 30 is operable for one of substantially impeding and enabling supply and passage of pressurized air from the air supply 38 to the container 24. The second valve 32 is coupled to the first outlet 36 of the container 24.

15 The decarbonization system 20 further comprises a nozzle 40 and a delivery unit 42 for delivery of the liquids 28 from the container 24 to the engine 22 via the nozzle 40. The delivery unit 42 preferably has two ends forming extremities thereof with the nozzle 40 being coupled to one end of the delivery unit 42 with the other end thereof being coupled to
20 the second valve 32 for interposing the second valve 32 between the container 24 and the delivery unit 42. In such a configuration, the second valve 32 is operable for one of substantially impeding and enabling passage of liquid 28 from the container 24 to the delivery unit 42. The delivery unit 42 is adapted for being retained at and positioning the nozzle 40 at least one of within and towards an intake manifold 44 of the engine 22.

25 Additionally, the decarbonization system 20 further comprises a controller 46 in signal communication with the first valve 30 and second valve 32 for controlling operation thereof. The controller 46 preferably has predefined a plurality of routines with each of the plurality of routines being indicative of at least one of a routine duration 50a, spray pattern 50b, at
30 least one spray pulse duration 50c and at least one duration 50d between spray pulses 50e. Further, the controller 36 has predefined a plurality of modes. The plurality of modes

comprises a STOP mode wherein the first valve 30 is operated to impede flow of compressed air supplied from the air supply 38 into the container 24 via the first inlet 34 and the second valve 32 is operated to impede flow of the liquid from the container 24 to the delivery unit 42. The plurality of modes further comprises a PLAY mode wherein the first valve 30 is operated to enable flow of compressed air into the container 24 via the first inlet 34 for pressurizing the container 24 and the second valve 32 is operated to enable flow of the liquid 28 from the pressurized container 24 to the delivery unit 42. The flow of the liquid 28 into the delivery unit 42 is controlled by the control based on one of the plurality of routines. The nozzle 40 is shaped and dimensioned for atomising the liquid 28 exiting the delivery unit 42 into an atomized mist 56 for being directed into the intake manifold 44 of the engine 22 for decarbonisation thereof.

It is preferred that the controller 46 comprises a user interface (UI) 58 for enabling switching between the plurality of modes and for viewing the plurality of routine for selecting one thereof therevia.

In the decarbonization method 100, the decarbonization system 20, specifically the container 24 thereof, is coupled to the air supply 38 in a step 110. The air supply 38 can be an air compressor, a compressed air tank or the like apparatus or resource for providing the compressed air. Independent of the step 110, the delivery unit 42 is coupled to the intake manifold 44 of the engine 22 in a step 112. Next, in a step 114, the engine crank revolution rate being substantially increased from an idle state. This can be achieved via various means including having elongated clamp structure extending and removably coupled between an accelerator pedal / gas pedal of the car and a driver's seat. Once configured between the accelerator pedal and the front seat, the front seat can be displaced towards the accelerator pedal for depressing the gas pedal while the engine 22 is running for increasing the crank revolution rate thereof. The clamp structure enables the engine 22 to be kept at a constant crank revolution rate (RPM) and allows a single operator to operate both the engine 22 and the decarbonization system 20.

Subsequent to the steps 112 and 114, a user is able to interact with the UI 58 of the controller 46 for selecting one of the plurality of routines for initiation of the PLAY mode in a step 116. It is preferred that the decarbonization system 20 is in the STOP mode prior to step 116 during configuring the decarbonization system 20 with the air supply 38 and the delivery unit 42 with the intake manifold 44 of the engine 22. During the PLAY mode in the step 116, it is preferred that operation of the second valve 32 by the controller 46 lags the operation of the first valve 30 by a pre-determined duration. This is to enable sufficient pressurization of the container 24 by the compressed air to create enough pressure to ensure creation of a sufficiently atomized mist with a sufficient throw distance and angle at the nozzle 40 for the effective delivery of the atomized mist 56 to the intake manifold 44 of the engine 22. The atomized mist 56 generated from the liquid 28 by the nozzle 40 is to reduce stalling of the engine 22 should the liquid 28 be delivered in a non-misted state. The decarbonisation method 100 terminates at the end of the selected one of the plurality of routines where the controller switches to the STOP mode in a step 118.

The delivery unit 42 comprises a retention structure 62 whereto the nozzle is coupled. The retention structure 62 is shaped and dimensioned for being retained between inter-coupled conduits 64 for forming an air passage 66 with the intake manifold 44 of the engine 22 for positioning the nozzle 40 towards the direction of air flow in the air passage 66. The delivery unit 42 further comprises a tube extending from the container 24 to the retention structure 62 for fluid communicating the enclosure 26 with the nozzle 40.

Preferably, the decarbonization system 20 further comprises a first tube 68 extending from the first inlet 34 into the enclosure 26 to terminate at a first free end distal a base 72 of the container 24. The decarbonization system 20 further comprises a second tube 74 extending from the first outlet 36 into the enclosure 26 for terminating at a second free end proximal the base 72 of the container 24. Each of the first tube 68 and the second tube 74 is shaped, dimensioned and configured such that when in use, the first free end of the first tube 68 is not submerged and the second free end of the second tube 74 is submerged in the liquid 28 contained in the enclosure 26 of the container 24. A gradient 77 is formed adjacent the base

72 of the container 24 to enable the liquid 28 to flow towards the second free end of the second tube 74 even when the liquid 28 is being depleted and at a low level within the container.

- 5 Preferably, the decarbonization system 20 comprises a pressure regulator 78 configured between the air supply 38 and the container 24 for regulating the pressure the compressed air being supplied to the container 24 and consequently the pressure or pressurization level within the enclosure 26. In addition or alternatively, the controller 46 further comprises at least one pressure sensor 80 disposed between the pressure regulator 78 and the container 24
10 or within the enclosure 26 for determining pressure level within the enclosure 26. The determined pressure level being transduced for provision to the controller 46 for being displayed by the UI 58. In addition to displaying the determined pressure level, the UI 58 can further display at least one of an indicator of the pressure level falling below a predetermined threshold pressure level, and an indicator of the pressure level being at least
15 at a reference pressure level.

- The decarbonization system 20 further comprises a third valve 82 and a fourth valve 84, with the container 24 defining a second inlet 86 and a second outlet 88 to the enclosure 26. The third valve 82 is coupled to the second inlet 86 and is adapted for intercoupling a liquid
20 receiver structure 90 with the container 24. The liquid receiver structure 90 is adapted for receiving replenishment for the liquid 28 contained within the enclosure 26. The third valve 82 is operable for one of substantially impeding and enabling passage of liquid replenishment from the liquid receiver structure 90 into the container 24. The fourth valve 84 is coupled to the second outlet 88 and is adapted for intercoupling a vent 92 with the
25 container 24. The fourth valve 84 is operable for one of substantially impeding and enabling escape of air from within the enclosure 26 and out via the vent 92 for depressurizing the container 24. The liquid receiver structure is shaped for receiving liquids poured directly thereto or from a funnel. Alternatively or additionally, the liquid receiver structure 90 is further adaptable for removably coupling with a liquid canister for receiving
30 replenishment liquid therefrom. Each of the first valve 30, second valve 32, third valve 82

and the fourth valve 84 is preferably a solenoid valve or the like electrically or electronically controllable valve that is wirelessly or via wired means controllable and operable by the controller 46.

- 5 The plurality of modes comprises a REFILL mode wherein the third valve 82 is operated to enable flow of liquids from the liquid receiver structure 90 into the container 24, and the fourth valve 84 is operated to enable escape of the air from within the enclosure 26 to aid flow of liquid replenishment through the second inlet 86 and into the enclosure 26. It is preferred that operation of the third valve 82 by the controller 46 lags the operation of the
10 fourth valve 84 by a pre-determined duration during the REFILL mode. This is to enable the container 24 to be sufficiently depressurized prior to and in facilitating flow of replenishment liquids therein via the liquid receiver structure 90.

Further, the third valve 82 is operated to impede flow of liquid into the enclosure 26 via the
15 second inlet 86 and the fourth valve 84 is operated to enable escape of air from the enclosure 26 via the second outlet 88 during each of the PLAY mode and the STOP mode.

The decarbonisation system 20 is adapted for use with liquids 28 with a particular chemical formulation to improve effectiveness and to prevent damage to the decarbonisation system
20 20 and the engines 22 used therewith. Preferably, the liquid 28 has a formulation comprising a carbon cleaning solvent and a lubricant. Hence, a determined volume of liquids 28 from an authorized source 94 will have a determined duration associated therewith to exhaust use of the determined volume of liquid 28. Hence, the controller 46 having a determined total authorized duration 96a wherefrom the routine duration 50a
25 associated with the selected one of the plurality of routines is deducted during the PLAY mode. When in use, the controller 46 will disable switching to the PLAY mode when the total authorized duration 96a is less than the routine duration 50a.

To ensure that the routine duration 50a is at least the total authorized duration 96a to enable switching to the PLAY mode, the total authorized duration 96a has to be topped up with the duration associated with the determined volume of liquid 28 purchased from the authorized source 94. Hence, the controller 46 is further for receiving and verifying validity of one of a plurality of predetermined top-up code 96b. Each of the plurality of predetermined top-up code 96b has a top-up duration 96c associated therewith. It is only when the top-up code 96b has been verified that the controller 46 is able to add the top-up duration 96c associated with the verified one of the plurality of top-up codes 96b to the total authorized duration 96a. The verified one of the plurality of top-up codes 96b can be received via one of the UI 58 during interaction of a user therewith, or from a control computing system 96d, for example a cloud-based system, the authorized source 94 or a third part host, in data communication with the controller 46.

The controller 46 enables the logging and storage of top-up made based on the top-up code 96b, the state of the total authorized duration 96a and usage data, for example duration and specific time of usage of the decarbonization system 20. This enables planning for preventive maintenance as well as to track utilization data for deriving, for example, return-on-investment (ROI) for the decarbonization system 20. Further, the data generated can be further collated to provide indicators of profit pilfering or abuse by employees operating the decarbonization system 20 for an owner thereof.

The decarbonization system 20 can further comprise a scope apparatus with an attached illuminator for being disposed into the intake manifold 44, or any other portion, of the engine 22 for inspection thereof prior to, during and subsequent to working of the decarbonization method 100. Still and moving images from within the intake manifold 44 can be captured by the scope apparatus and be processed and recorded by the controller 46 for in-situ or subsequent viewing on the UI 58. Hence, the scope apparatus can be used for determining effectiveness of the decarbonization system 20 and extent of carbonization prior to application of the decarbonization method 100.

The decarbonization system 20 as described is a single engine configuration for use with a single unit of the engine 22. However, the decarbonization system 20 can also be adapted for use with multiple units of the engine 22 in tandem in a multiple engine embodiment. In the multiple engine embodiment, the decarbonization system 20 further comprises a
5 distribution manifold 200, for example a flow distribution junction, disposed between the first outlet 36 and multiple units of the second valve 32. In the multiple engine embodiment, the decarbonization system 20 comprises multiple units of the delivery unit 42 with each of the multiple units of the second valve 32 interposing and inter-fluid communicating the manifold 200 and one of the multiple units of the delivery unit 42. Similar to single engine
10 configuration, each of the multiple units of the second valve 32 is in one of wired and wireless communication with a single unit of the controller 46 for control thereby. It is preferred that multiple units of the elongated clamp structure be used for increasing and maintaining the RPM of each of the multiple units of engine 22. Each of the multiple unit of the second valve 32 and the delivery unit 42 coupled thereto is for use with one of the
15 multiple units of the engine 22. The user of the decarbonization system 20 is able to select one of the plurality of routines for each of the multiple units of the engine 22 using the UI 58 so that the multiple units of the engine 22 may have differing routines associated therewith that is specifically catered to at least one of make and engine capacity thereof each of the multiple units of the engine 22. Alternatively, the controller 46 may only permit the
20 selection of only one of the plurality of routines for use on all the multiple units of the engine 22 at the same time.

Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing decarbonization methods and systems. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit

5 such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a person of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations,

10 and/or improvements may be made to various embodiments that are disclosed by a person of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A decarbonisation system comprising:

a container defining an enclosure for containing liquids and a first inlet and a first outlet to the enclosure;

5 a first valve coupled to the first inlet and adapted for intercoupling an air supply and the container, the first valve being operable for one of substantially impeding and enabling passage of pressurized air from the air supply to the container;

a second valve coupled to the first outlet;

a delivery unit having two ends forming extremities thereof;

10 a nozzle coupled to one end of the delivery unit with the other end thereof being coupled to the second valve for interposing the second valve between the container and the delivery unit, the second valve being operable for one of substantially impeding and enabling passage of liquid from the container to the delivery unit, the delivery unit being adapted for being retained at and positioning the nozzle at least one
15 of within and towards the intake manifold of an engine; and

a controller in signal communication with the first valve and second valve for controlling operation thereof, the controller having predefined a plurality of routines, each of the plurality of routines indicative of at least one of a routine duration, spray pattern, at least one spray pulse duration and at least one duration between spray
20 pulses, the controller having a plurality of modes comprising:

a STOP mode wherein the second valve is operated to impede flow of the liquid from the container to the delivery unit, and

a PLAY mode wherein the second valve is operated to enable flow of the liquid from the pressurized container to the delivery unit, the flow of the liquid
25 into the delivery unit being controlled by the controller based on one of the plurality of routines, the nozzle being shaped and dimensioned for atomising the liquid exiting the delivery unit into an atomized mist for being directed into the intake manifold of the engine for decarbonisation thereof.

2. The decarbonization system as in claim 1, wherein the first valve is operated to impede flow of compressed air into the container via the first inlet when the controller is in the STOP mode and the first valve is operated to enable flow of compressed air into the container via the first inlet for pressurizing the container when the controller is in the PLAY mode.

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3. The decarbonisation system as in claim 2, wherein operation of the second valve by the controller lags the operation of the first valve by a pre-determined duration during the PLAY mode.

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4. The decarbonisation system as in claim 1, the engine crank revolution rate being substantially increased from an idle state prior to and during activation of the PLAY mode.

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5. The decarbonisation system as in claim 1, the air supply comprising an air compressor.

6. The decarbonisation system as in claim 1, the controller comprising a user interface (UI) for enabling switching between the plurality of modes and for viewing the plurality of routines for selecting one thereof therevia.

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7. The decarbonisation system as in claim 6, the controller further comprising at least one pressure sensor disposed for determining pressure level within the enclosure, the determined pressure level being transduced for provision to the controller, the UI further displaying at least one of the determined pressure level within the container, an indicator of the pressure level falling below a predetermined threshold pressure level, and an indicator of the pressure level being at least at a reference pressure level.

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8. The decarbonisation system as in claim 6, the controller having a determined total authorized duration wherefrom the routine duration associated with the selected one of the plurality of routines is deducted during the PLAY mode, the controller disabling switching to the PLAY mode when the total authorized duration is less than the routine duration.

9. The decarbonisation system as in claim 8, the controller for receiving and verifying validity of one of a plurality of predetermined top-up code, each of the plurality of predetermined top-up code having a top-up duration associated therewith, the controller for adding the top-up duration associated with the verified one of the plurality of top-up codes to the total authorized duration, the verified one of the plurality of top-up codes being received from one of the UI during interaction of a user therewith and from a control computing system in data communication with the controller.

10. The decarbonisation system as in claim 1, the delivery unit comprising:
a retention structure whereto the nozzle is coupled, the retention structure being shaped and dimensioned for being retained between inter-coupled conduits for forming an air passage adjacent the intake manifold of the engine for positioning the nozzle towards the direction of air flow in the air passage; and
a tube extending from the container to the retention structure for fluid communicating the enclosure with the nozzle.

11. The decarbonisation system as in claim 1, further comprising:

a first tube extending from the first inlet into the enclosure to terminate at a first free end distal the base of the container; and

5 a second tube extending from the first outlet into the enclosure for terminating at a second free end proximal the base of the container, wherein when in use, the first free end of the first tube is not submerged and the second free end of the second tube is submerged in the liquid contained in the enclosure of the container.

12. The decarbonisation system as in claim 1, the container further defining a second inlet and a second outlet to the enclosure, the decarbonisation system further comprising:

10 a third valve coupled to the second inlet and adapted for intercoupling a liquid receiver structure and the container, the liquid receiver structure being adapted for receiving liquids for replenishing the liquid contained within the enclosure, the third valve being operable for one of substantially impeding and enabling passage of liquid from the liquid receiver structure into the container; and

15 a fourth valve coupled to the second outlet and adapted for intercoupling a vent and the container, the fourth valve being operable for one of substantially impeding and enabling escape of air from within the enclosure and out of the vent, the escape of air from the enclosure for depressurizing the container.

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13. The decarbonisation system as in claim 12, the controller being further in signal communication with the third valve and the fourth valve, the plurality of modes further comprising:

5 a REFILL mode wherein the third valve is operated to enable flow of liquids from the liquid receiver structure into the container and the fourth valve is operated to enable escape of the air from within the enclosure to aid flow of liquid into the second inlet,

10 wherein the third valve is operated to impede flow of liquid into the enclosure via the second inlet and the fourth valve is operated to enable escape of air from the enclosure via the second outlet during each of the PLAY mode and the STOP mode.

14. The decarbonisation system as in claim 1, the liquid receiver structure being further adapted to removably couple with a liquid canister for receiving liquid therefrom.

15. The decarbonisation system as in claim 1, wherein operation of the third valve by the controller lags the operation of the fourth valve by a pre-determined duration during the REFILL mode.

16. A decarbonisation method comprising:

coupling a container to an air supply for receiving pressurized air therefrom, the container defining an enclosure for containing liquids, a first inlet to the container
5 wherewith a first valve couples and a first outlet to the container wherewith a second valve couples, the first valve inter-couples the air supply and the container and is operable for one of substantially impeding and enabling passage of pressurized air from the air supply to the container;

configuring a delivery unit with an engine to thereby position a nozzle coupled
10 to one of two extremities thereof at least one of within and towards the intake manifold of an engine, the other of the two extremities of the delivery unit being coupled to the second valve for interposing the second valve between the container and the delivery unit, the second valve being operable for one of substantially impeding and enabling passage of liquid from the container to the delivery unit, a
15 controller in signal communication with the first valve and second valve for controlling operation thereof; and

initiating one of a plurality of routines predefined with the controller, each of the plurality of routines being indicative of at least one of a routine duration, spray pattern, at least one spray pulse duration and at least one duration between spray pulses, the
20 one of the plurality of routines being initiated by operating the second valve to enable flow of the liquid from the pressurized container to the delivery unit, the flow of the liquid into the delivery unit being controlled by the controller based on one of the plurality of routines, the nozzle being shaped and dimensioned for atomising the liquid exiting the delivery unit into an atomized mist for being directed into the intake
25 manifold of the engine for decarbonisation thereof,

wherein the initiated one of the plurality of routine is one of terminated and completed by operating the second valve to impede flow of the liquid from the container to the delivery unit.

17. The decarbonization method as in claim 16, wherein the one of the plurality of routines is initiated further by operating the first valve is operated to enable flow of compressed air into the container via the first inlet for pressurizing the container and the initiated one of the plurality of routines is terminated further by operating the first valve to impede flow of compressed air into the container via the first inlet.

18. The decarbonisation method as in claim 17, initiating one of a plurality of routines predefined with the controller comprising:

operating of the first valve by a pre-determined duration prior to operating the second valve during the PLAY mode.

19. The decarbonisation method as in claim 16, initiating one of a plurality of routines predefined with the controller comprising:

substantially increasing the engine crank revolution rate from an idle state prior to and during activation of the PLAY mode.

20. The decarbonisation method as in claim 16, initiating one of a plurality of routines predefined with the controller comprising:

determining total authorized duration wherefrom the routine duration associated with the selected one of the plurality of routines is deducted during the PLAY mode; and

disabling switching to the PLAY mode when the total authorized duration is less than the routine duration by the controller.

21. The decarbonisation method as in claim 20, initiating one of a plurality of routines predefined with the controller further comprising:

receiving and verifying validity of one of a plurality of predetermined top-up code by the controller, each of the plurality of predetermined top-up code having a top-up duration associated therewith, the controller for adding the top-up duration associated with the verified one of the plurality of top-up codes to the total authorized duration, the verified one of the plurality of top-up codes being received from one of the UI during interaction of a user therewith and from a control computing system in data communication with the controller.

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22. The decarbonisation method as in claim 16, the container comprising:

a first tube extending from the first inlet into the enclosure to terminate at a first free end distal the base of the container; and

a second tube extending from the first outlet into the enclosure for terminating at a second free end proximal the base of the container, wherein when in use, the first free end of the first tube is not submerged and the second free end of the second tube is submerged in the liquid contained in the enclosure of the container.

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