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(54) **PRE START FRICTION PROTECTION SYSTEM**

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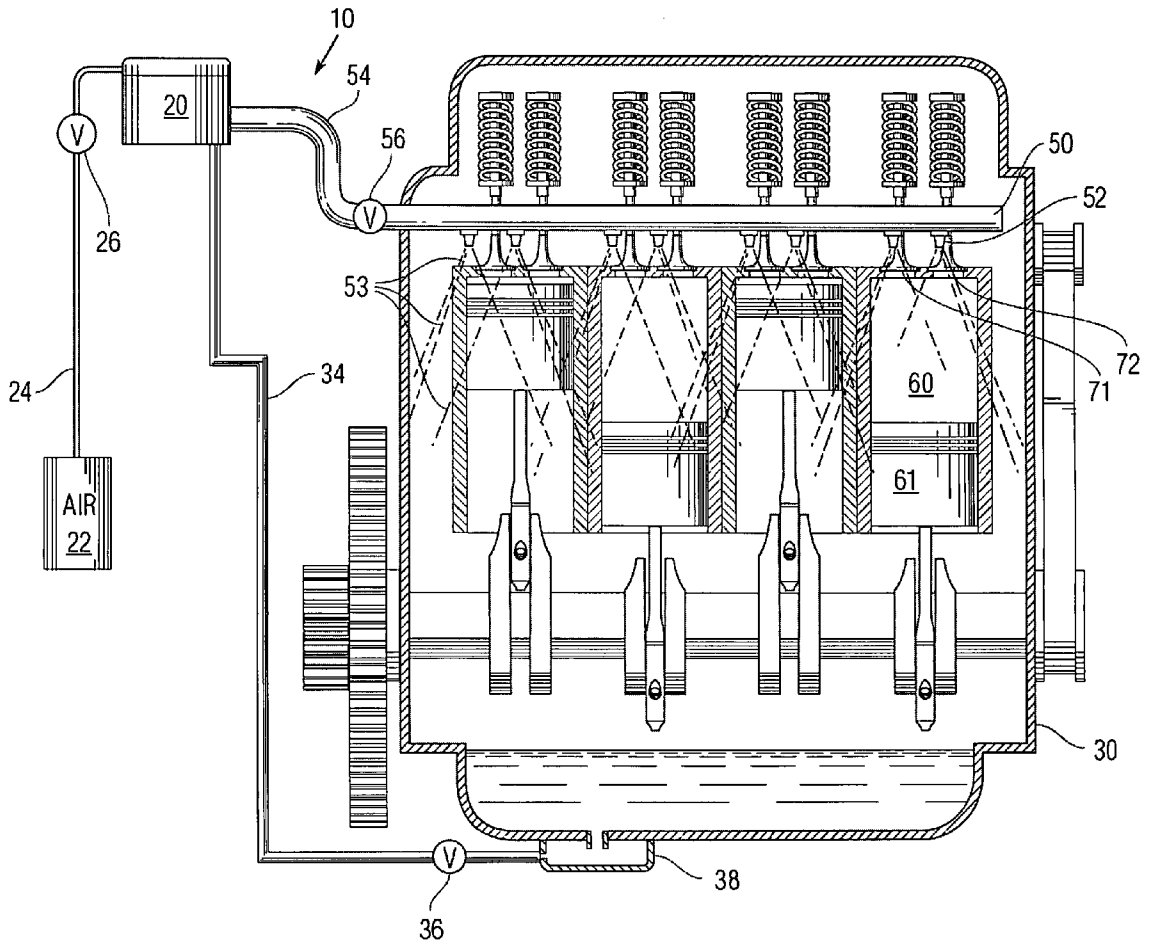
(57) **ABSTRACT**

A system for reducing friction in an engine during start-up having an oil canister which holds oil, an air supply unit for providing air to the canister through an air intake line and valve, an oil intake line for transmitting oil from the engine oil reservoir to the canister, and a distribution rod connected to the canister through a distribution line. The distribution rod has various ports for discharging the oil over the engine parts which need lubrication prior to engine start-up. The nozzles may provide precise and uniform discharge patterns. The system may include a controller for receiving the pre-start notification and for controlling the valves and air supply unit.



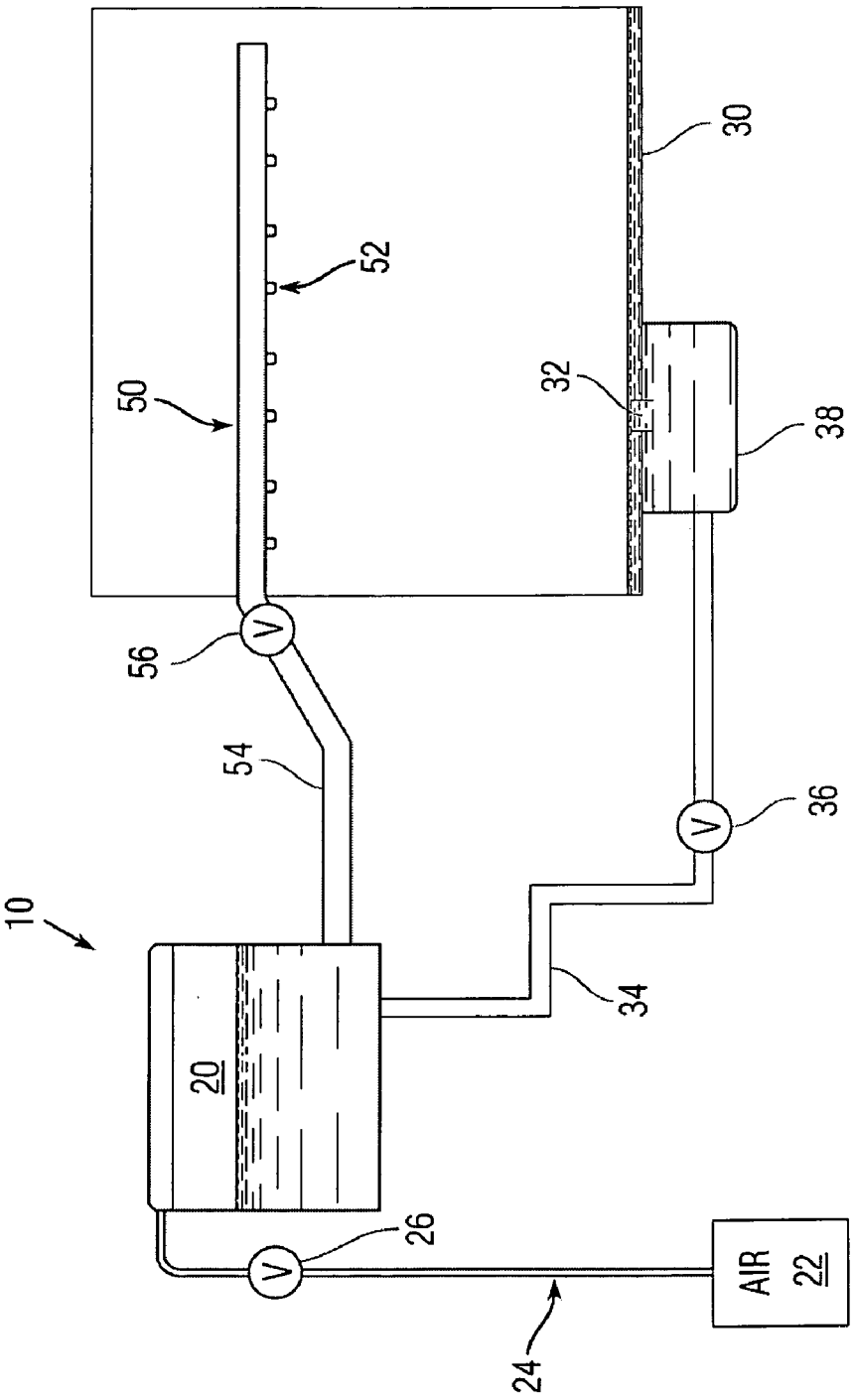


Fig. 1

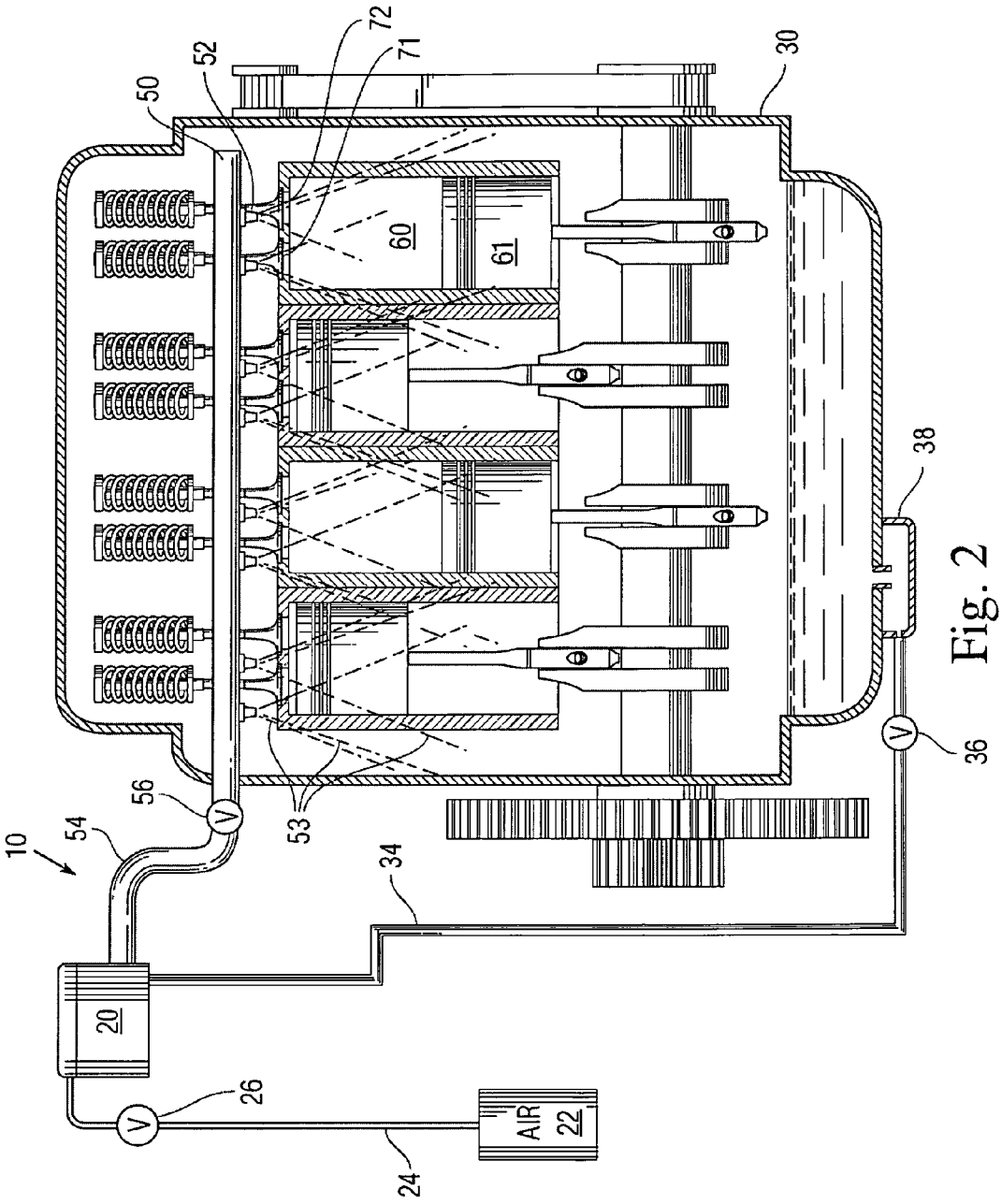


Fig. 2

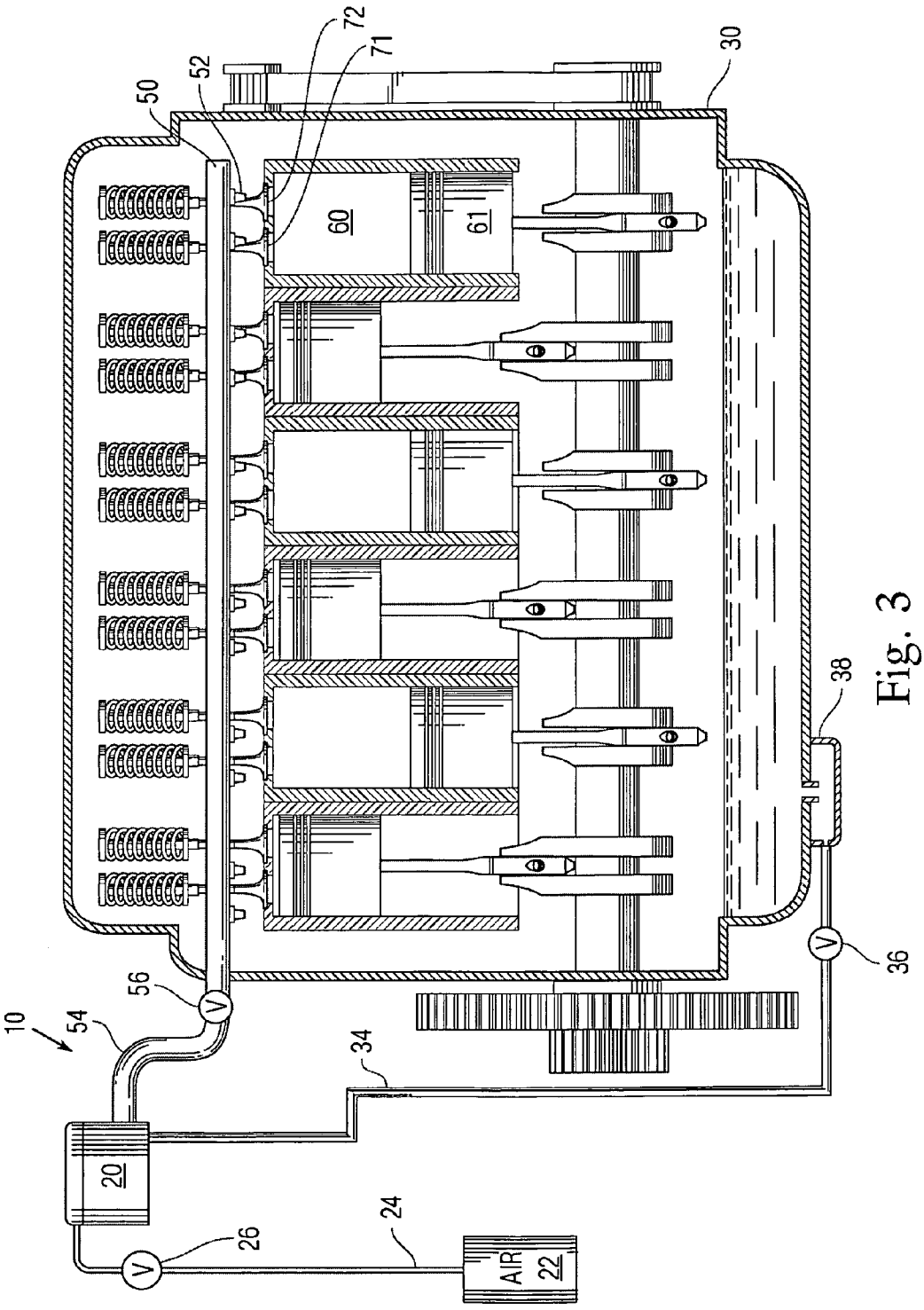


Fig. 3

PRE START FRICTION PROTECTION SYSTEM

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/356,030 filed on Jun. 17, 2010 entitled "Pre Start Friction Protection System", the entirety of which is incorporated herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention relates to a system used cooperatively with an engine to reduce friction at start up by delivering lubricant to engine parts before start up.

[0004] 2. Background

[0005] Engine wear is difficult to prevent and can affect engine performance. Engine start up is a major cause of engine wear due to excessive friction during start up. A significant factor in the amount of friction at start-up is the lack of sufficient lubricant on the engine components. Current mechanical systems which attempt to address this problem often include systems which pump oil from the oil reservoir and push the oil to the internal oil pressure system to lubricate the wearing parts. However, the current systems have many moving parts and do not provide an easy solution for distributing the oil evenly across the wearing parts during pre-start.

[0006] Accordingly, there is a need for a system which minimizes friction during start up by effectively delivering lubricant, such as oil, evenly to the engine wearing parts before ignition.

SUMMARY OF THE INVENTION

[0007] This summary is provided to introduce a selection of concepts in a simplified form that are further described in the detailed description of the invention. This summary is not intended to identify key or essential inventive concepts of the claimed subject matter, nor is it intended for determining the scope of the claimed subject matter.

[0008] The present invention provides a pre-start lubrication system for an engine which is comprised of an oil canister for holding a volume of oil; an air supply unit fluidly connected to the oil canister through an air intake line and an air intake valve for providing air under pressure to the canister; an oil intake line fluidly connected to an engine oil reservoir and the oil canister wherein the oil intake line includes an oil intake valve for controlling the flow of oil from the oil reservoir to the oil canister; an oil distribution line fluidly connected to the canister and an oil distribution rod, wherein the oil distribution line includes an oil distribution valve for controlling the flow of oil from the canister to the oil distribution rod; and wherein the oil distribution rod has a plurality of dispensing ports for dispensing oil; a controller for receiving a signal and powering the air supply unit to provide air to the canister through the air intake line and air intake valve which will push oil from the canister through the oil distribution line and oil distribution valve to the oil distribution rod wherein the oil will exit the distribution rod through the dispensing ports. The dispensing ports may be nozzles including cone spray nozzles. The dispensing ports may be aligned over a plurality of valves or pistons. The controller may receive the signal to power the air supply unit as part of an engine ignition sequence. The controller may control the power to the air supply unit or how long the air supply unit is provided power. The controller may also control one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

[0009] The present invention also provides a system for reducing friction in an engine during start-up which includes a canister for holding a volume of lubricant; an air supply unit fluidly connected to the canister through an air intake line and a one way air intake valve for providing air under pressure to the canister; the one way air intake valve configured to allow air into the canister while preventing air from escaping the canister; a bypass valve in the canister for releasing air in the canister if the pressure is too high; a lubricant intake line fluidly connected to an engine lubricant reservoir and the canister wherein the lubricant intake line includes a lubricant intake valve for controlling the flow of lubricant from the lubricant reservoir to the canister; a lubricant distribution line fluidly connected to the canister and a lubricant distribution rod with a plurality of discharge ports, wherein the lubricant distribution line includes an lubricant distribution valve for controlling the flow of lubricant from the canister to the distribution rod; and upon engine ignition lubricant is delivered to the distribution rod and exits through the plurality of discharge ports to predetermined engine parts. Further, the dispensing ports may be nozzles including cone spray nozzles. The dispensing ports may be aligned over a plurality of valves or pistons. The controller may receive the signal to power the air supply unit as part of an engine ignition sequence. The controller may control the power to the air supply unit or how long the air supply unit is provided power. The controller may also control one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

[0010] The present invention also provides a method of lubricating an engine prior to starting the engine including filling an oil canister with a volume of oil from an oil reservoir through an oil intake line and an oil intake valve; receiving a signal to initiate the pre-start lubrication process; controlling an air supply unit to provide air to the oil canister through an air intake line and an air intake valve; wherein the air added to the canister forces the oil within the canister to flow from the canister to an oil distribution rod through an oil distribution line and an oil distribution valve; and wherein the oil is dispensed through a plurality of dispensing ports in the oil distribution rod. The method might further include controlling how long the air supply unit provides air to the oil canister or controlling how much air pressure the air supply unit provides to the oil canister.

[0011] The components of the invention are a lubricant reservoir canister, a pressure line for delivering lubricant to the canister, a bypass valve and an oil distribution rod, wherein upon engine ignition, lubricant is delivered to predetermined engine parts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The foregoing summary, as well as the following detailed description of the invention, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, exemplary constructions of the invention are shown in the drawings. However, the invention is not limited to the specific methods and instrumentalities disclosed herein.

[0013] FIG. **1** illustrates the pre-start Friction Protection system in accordance with the present invention.

[0014] FIG. **2** illustrates an four cylinder engine with the pre-start system connected thereto;

[0015] FIG. **3** illustrates a six cylinder engine with the pre-start system connected thereto.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0016] Particular embodiments of the present invention will now be described in greater detail with reference to the figures.

[0017] FIGS. **1-3** illustrate a Pre-Start Friction Protection System **10** which is cooperatively mounted to an engine **30**, in accordance with the present invention. The system **10** is configured to reduce pre-start friction between components by delivering fluid or oil to critical parts before the engine is started. As such, the system **10** cooperatively works with the engine **30** and its components. The system **10** comprises an oil canister **20**, a pressure line **24**, an air supply **22**, an air line valve **26**, an oil intake line **34**, an oil intake line valve **36**, and oil reservoir **38**, an oil distribution line **54**, an oil distribution valve **56** and an oil distribution rod **50**.

[0018] The oil reservoir canister **20** has an intake line **34** for receiving oil and a distribution line **54** for dispensing or transferring oil from the canister **20** to the distribution rod **50**. Oil is stored in the oil reservoir canister **20** for distribution to the engine **30** through the distribution rod **50**. The intake line **34** is connected to the main oil gallery of engine **30**. The intake line **34** may connect directly to the main oil gallery or may be connected to an oil reservoir **38**. The oil reservoir **38** would be in fluid communication with the main oil gallery via opening **32**. Oil from the engine or oil reservoir **38** flows through the intake line **34** to fill canister **20**. Valve **36** controls flow between the oil reservoir **38** and canister **20** and can be opened to allow oil to fill up canister **20**. The valve **36** could also be a two way valve which allows oil to flow from canister **20** back through line **34** to reservoir **38**. Using a two way valve for valve **36** would be useful if the pressure in canister **20** becomes too high to prevent an over oiling or an over pressurized delivery of oil through distribution rod **50**. In an over pressurized system, valve **36** would open in the reverse allowing oil to flow back to reservoir **38**.

[0019] Initially, when an ignition switch is turned into the "on" position in the vehicle, an electronic switch is activated signaling the air supply **22**, such as an air compressor, to provide air to canister **20** through air intake line **24**. Valve **26** is ideally a one way valve allowing air to flow into the pressurized canister **20** but not allowing air or oil to flow in the opposite direction. Upon pressurization of canister **20** oil flows from canister **20** through distribution line **54** and valve **56** into distribution rod **50**. The oil flows evenly through distribution rod **50** to the exit nozzles **52**. The exit nozzles **52** allow for even flow and distribution of the oil from the distribution rod **50** into the engine **30**.

[0020] In an exemplary embodiment, valve **56** is a pressure sensitive valve that allows oil to pass through the valve when the pressure or force of the oil on the valve forces it to open. When the pressure in canister **20** falls below a certain threshold the valve **56** will shut and oil will stop flowing to the distribution rod **50**. The canister **20** may also have an air exhaust valve such that is the air pressure within the canister **20** exceeds a certain pressure the exhaust valve would open allowing air within canister **20** to be released and reduce pressure.

[0021] The main oil supply of engine **30** follows its normal course. While the engine **30** is in operation, the oil in the oil canister **20** fills to capacity as oil flows from reservoir **38** or the main oil supply of engine **30** through oil intake line **34** and valve **36**. Once capacity is reached, shut-off valve **36** is activated, preventing additional oil from entering into canister **20**. Oil reservoir **38** may be placed down line of the engine **30** oil filter (not shown) such that clean oil is used to fill canister **20**.

[0022] In the preferred embodiment, the canister **20** capacity would be approximately one pint. After the engine **30** is turned off, although most of the oil in engine **30** returns to the oil pan, the oil in canister **20** is prevented from returning because of valve **36**.

[0023] The next time the vehicle's ignition switch is turned on; the pressurized air forces the oil contained in the oil canister **20** to be immediately dispersed to critical engine parts through distribution rod **50**. This process significantly reduces the pre-start friction experienced upon ignition. Alternatively, the system **10** could be designed such that the canister **20** uses gravity instead of air pressure to force oil flow to the distribution rod **50**.

[0024] As seen in FIG. **2**, the system **10** is employed on an inline four cylinder engine **30**. The distribution rod **50** contains one or more openings or nozzles **52**. In the preferred embodiment, there are nozzles **52** associated with each valve or piston. As oil flows through the distribution rod **50** the oil is dispensed out of the nozzles **52** and sprayed upon the engine **30** components. The engine **30** components include valves **71**, **72**, the piston chamber **60**, the piston head **61**, as well as the rocker arms, springs, and cam shafts.

[0025] In one exemplary embodiment, the distribution rod **50** is enclosed below the valve cover but above the valves **71**, **72**, piston chamber **60**, and piston head **61**. The system **10** and the distribution rod **50** would be configured to provide a sealed engagement with the engine **30** and valve cover.

[0026] FIG. **3** shows another exemplary embodiment of the present invention with the pre-start friction protection system **10** and distribution rod **50** designed for an inline six cylinder engine **30**. The distribution rod **50** has a plurality of nozzles **52**. The distribution rod **50**, depicted in FIG. **3** has twelve nozzles **52** designed such that each nozzle **52** sprays oil onto a desired valve **71**, **72**. The oil spray **53** can be defined in shape and size by the design of the nozzle. The nozzles **52** could also be arranged to provide an even oil spray over other internal parts and need not be aligned over a valve **71**, **72**.

[0027] In operation, when canister **20** reaches its capacity, the bypass valve **36** is activated closing the oil feed line **34** to prevent additional oil from entering the canister **20**. With the filling of oil in canister **20** complete, when the ignition is turned to an "on" position, the air pressure in canister **20** increases which rapidly sends the oil through distribution line **54**, through valve **56** to distribution rod **50**. The present invention provides a precise oil distribution system which distributes oil equally among the nozzles **52** which then provide a precise oil distribution to the rocker arms, pistons, and valves.

[0028] Although the distribution rod **50** depicted in FIGS. **1-3** shows a single distribution rod **50** applied to an inline engine the system **10** could employ more than one distribution rods to different parts of the motor. For example, in a V-type engine the system **10** might employ two distribution rods **50** connected to each other, connected to valve **56**, or to the canister **20**. Thus, the system **10** could be comprised of several distribution rods **50**, distribution lines **54** and valves **56**.

[0029] Further, the ignition switch could be connected to a controller which controls the air supply unit **22** as well as

control one or more valves **26**, **36**, **56**. The controller, air supply unit **22**, and valves **26**, **36**, **56** could be controlled by one or more timers designed to regulate or control the time period air or oil are pumped into canister **20** or the time period oil is distributed to the distribution rod **50**.

[0030] The various components of the system **10** may be made from common or standard materials including cast iron, aluminum alloys, steel, titanium, or other metal alloys capable of handling the temperatures range as well as resistance to wear, corrosion, and damage. The valves **26**, **36**, **56** may be ball valves, solenoid valves, spring controlled valves and the like.

[0031] The nozzles **52** on the distribution rod **50** may be of various types which are fastened to or integrated into the rod **50**. The nozzles **52** enable the application to provide a profile spray and oil is dispensed. The nozzle **52** design enables spray profiles to include a solid cone spray, a semi sold cone spray, and a hollow cone spray. Further, the distribution rod **50** need not use nozzles **52** and may instead use machined openings or ports which when providing or dispensing oil under pressure provide sufficient exhaust spray.

[0032] The present invention may also make use of a controller (not shown) which may be independent, integrated with, or be a part of the control system of the vehicle with the engine. The controller may receive a signal to initiate the pre-start lubrication process. The signal may be part of an ignition sequence to start the engine. Upon receipt of the initiation signal, the controller will control the air supply to begin providing air into the canister **20**. The controller may control the air supply by controlling the power provided to the air supply unit, by controlling the time air is provided, or by providing the power or amount of air provided. The controller may also control the various valves in the system such as the air intake valve **26**, the oil intake valve **36**, and the oil discharge valve **56** to control the amount of air or oil provided to the canister **20** or the control the oil provided to the distribution rod **50**.

[0033] In summary the present invention provides a pre-start lubrication system for an engine which is comprised of an oil canister for holding a volume of oil; an air supply unit fluidly connected to the oil canister through an air intake line and an air intake valve for providing air under pressure to the canister; an oil intake line fluidly connected to an engine oil reservoir and the oil canister wherein the oil intake line includes an oil intake valve for controlling the flow of oil from the oil reservoir to the oil canister; an oil distribution line fluidly connected to the canister and an oil distribution rod, wherein the oil distribution line includes an oil distribution valve for controlling the flow of oil from the canister to the oil distribution rod; and wherein the oil distribution rod has a plurality of dispensing ports for dispensing oil; a controller for receiving a signal and powering the air supply unit to provide air to the canister through the air intake line and air intake valve which will push oil from the canister through the oil distribution line and oil distribution valve to the oil distribution rod wherein the oil will exit the distribution rod through the dispensing ports. The dispensing ports may be nozzles including cone spray nozzles. The dispensing ports may be aligned over a plurality of valves or pistons. The controller may receive the signal to power the air supply unit as part of an engine ignition sequence. The controller may control the power to the air supply unit or how long the air supply unit is provided power. The controller may also control one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

[0034] The system of the present invention is not limited to oil and any logical lubricant could be used. The system may include a bypass valve in the canister for releasing air in the canister if the pressure is too high. Further, the dispensing ports may be nozzles including cone spray nozzles. The dispensing ports may be aligned over a plurality of valves or pistons. The controller may receive the signal to power the air supply unit as part of an engine ignition sequence. The controller may control the power to the air supply unit or how long the air supply unit is provided power. The controller may also control one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

[0035] In addition, the present invention also provides a method of lubricating an engine prior to starting the engine including the steps of filling an oil canister with a volume of oil from an oil reservoir through an oil intake line and an oil intake valve; receiving a signal to initiate the pre-start lubrication process; controlling an air supply unit to provide air to the oil canister through an air intake line and an air intake valve; wherein the air added to the canister forces the oil within the canister to flow from the canister to an oil distribution rod through an oil distribution line and an oil distribution valve; and wherein the oil is dispensed through a plurality of dispensing ports in the oil distribution rod. The method might further include controlling how long the air supply unit provides air to the oil canister or controlling how much air pressure the air supply unit provides to the oil canister.

[0036] The foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present method and product disclosed herein. While the invention has been described with reference to various embodiments, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Further, although the invention has been described herein with reference to particular means, materials, and embodiments, the invention is not intended to be limited to the particulars disclosed herein; rather, the invention expands to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims. Those skilled in the art, having the benefit of the teachings of this specification, may affect numerous modifications thereto and changes may be made without departing from the scope and spirit of the invention in its aspects.

What is claimed:

1. A pre-start lubrication system for an engine comprising:

an oil canister for holding a volume of oil;

an air supply unit fluidly connected to the oil canister through an air intake line and an air intake valve for providing air under pressure to the canister;

an oil intake line fluidly connected to an engine oil reservoir and the oil canister wherein the oil intake line includes an oil intake valve for controlling the flow of oil from the oil reservoir to the oil canister;

an oil distribution line fluidly connected to the canister and an oil distribution rod, wherein the oil distribution line includes an oil distribution valve for controlling the flow of oil from the canister to the oil distribution rod; and

wherein the oil distribution rod has a plurality of dispensing ports for dispensing oil;

a controller for receiving a signal and powering the air supply unit to provide air to the canister through the air intake line and air intake valve which will push oil from the canister through the oil distribution line and oil distribution valve to the oil distribution rod wherein the oil will exit the distribution rod through the dispensing ports.

2. The system of claim **1**, wherein the dispensing ports are nozzles.

3. The system of claim **2**, wherein the nozzles are cone spray nozzles.

4. The system of claim **1**, wherein the plurality of dispensing ports are aligned over a plurality of valves.

5. The system of claim **1**, wherein the plurality of dispensing ports are aligned over a plurality of piston chambers.

6. The system of claim **1**, wherein the controller receives the signal to power the air supply unit as part of an engine ignition sequence.

7. The system of claim **6**, wherein the controller controls power to the air supply unit.

8. The system of claim **1**, wherein the controller controls how long the air supply unit provides air.

9. The system of claim **1**, wherein the controller controls one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

10. A system for reducing friction in an engine during start-up comprising:

a canister for holding a volume of lubricant;

an air supply unit fluidly connected to the canister through an air intake line and a one way air intake valve for providing air under pressure to the canister;

the one way air intake valve configured to allow air into the canister while preventing air from escaping the canister;

a bypass valve in the canister for releasing air in the canister if the pressure is too high;

a lubricant intake line fluidly connected to an engine lubricant reservoir and the canister wherein the lubricant intake line includes a lubricant intake valve for controlling the flow of lubricant from the lubricant reservoir to the canister;

a lubricant distribution line fluidly connected to the canister and a lubricant distribution rod with a plurality of discharge ports, wherein the lubricant distribution line includes an lubricant distribution valve for controlling the flow of lubricant from the canister to the distribution rod; and

wherein upon engine ignition lubricant is delivered to the distribution rod and exits through the plurality of discharge ports to predetermined engine parts.

11. The system of claim **10**, wherein the dispensing ports are nozzles.

12. The system of claim **11**, wherein the nozzles are cone spray nozzles.

13. The system of claim **10**, wherein the plurality of dispensing ports are aligned over a plurality of valves.

14. The system of claim **10**, wherein the plurality of dispensing ports are aligned over a plurality of piston chambers.

15. The system of claim **10**, wherein the controller receives the signal to power the air supply unit as part of an engine ignition sequence.

16. The system of claim **10**, wherein the controller controls power to the air supply unit.

17. The system of claim **10**, wherein the controller controls how long the air supply unit provides air.

18. The system of claim **10**, wherein the controller controls one or more of the air intake valve, the oil intake valve, and the oil discharge valve.

19. A method of lubricating an engine prior to starting the engine comprising the steps of:

filling an oil canister with a volume of oil from an oil reservoir through an oil intake line and an oil intake valve;

receiving a signal to initiate the pre-start lubrication process;

controlling an air supply unit to provide air to the oil canister through an air intake line and an air intake valve;

wherein the air added to the canister forces the oil within the canister to flow from the canister to an oil distribution rod through an oil distribution line and an oil distribution valve; and

wherein the oil is dispensed through a plurality of dispensing ports in the oil distribution rod.

20. The method of claim **19**, further including the step of controlling how long the air supply unit provides air to the oil canister.

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