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MOISTURIZERS AND VAPORIZERS FOR INTERNAL COMBUSTION ENGINES

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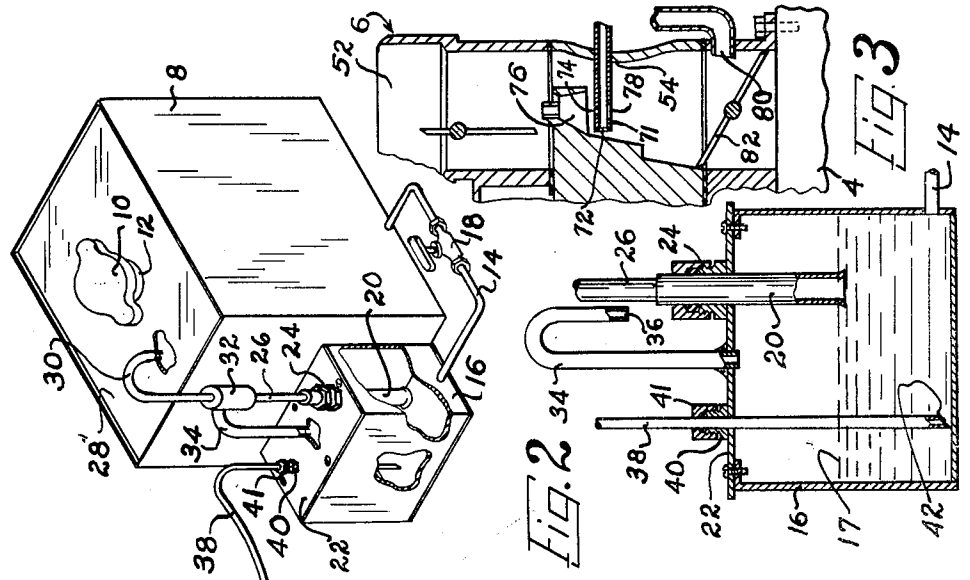


Fig. 2




Fig. 3

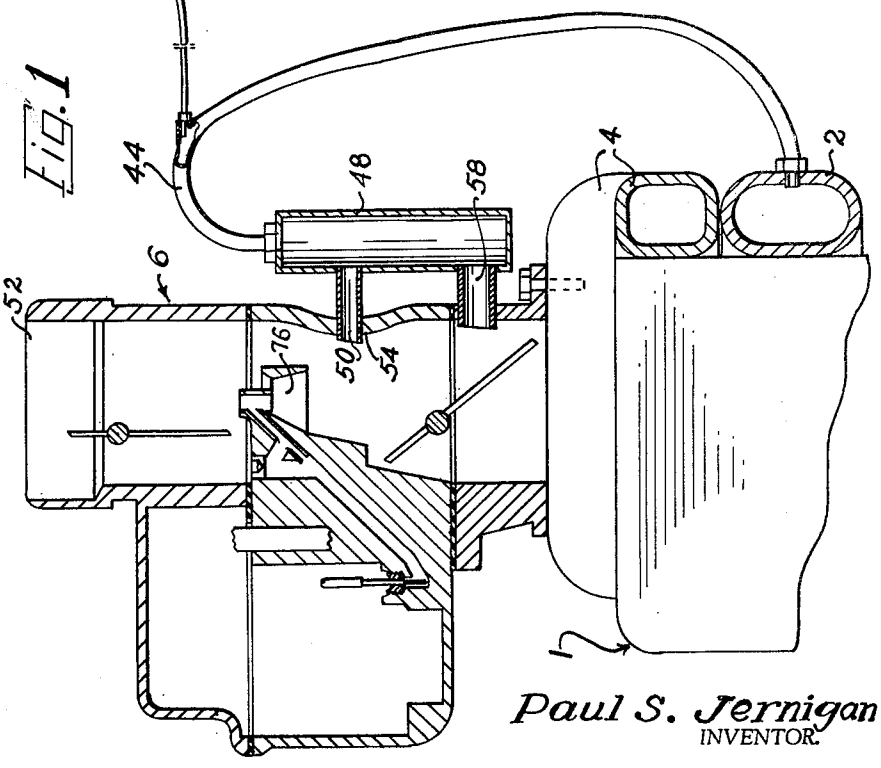


Fig. 1

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# MOISTURIZERS AND VAPORIZERS FOR INTERNAL COMBUSTION ENGINES

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This invention relates to moisturizers and vaporizers for internal combustion engines, and more particularly to a moisturizer wherein heated, vaporized water moisture is directed into the intake manifold with the hydrocarbon vapors utilized for propelling an internal combustion engine.

Various devices for introducing water into the intake manifold of an internal combustion engine have been proposed heretofore, but these, for the most part, will perform at a set speed or when the water is feeding into the manifold or into the throat of the carburetor through which air is drawn. These for the most part utilize float valves or the like in an effort to maintain the water at a given level, however, when these valves fail, serious damage can occur by permitting unvaporized water to be injected into the engine, which could find its way into the lubricating oil system.

The present device is so constructed that no moving parts are required for operation and the water vapor is fed into the suction of the throat of the barrel, or barrels, of the carburetor, if more than one barrel is present in accordance with the suction, and when the suction ceases the pressure becomes equalized and no further water vapor is injected into the carburetor until such time as the engine is re-started.

Provision is made to introduce hot exhaust gases or the products of combustion back into the barrel, or barrels, of the carburetor in such manner that the water vapor is intermixed therewith and heated, which enables more thorough vaporization of the water and permits the "re-burn" of any unburned hydrocarbons in the exhaust gases, thereby increasing fuel efficiency and presenting a warm, moist mixture for introduction into the barrel of the carburetor immediately after the engine starts. This increases combustion efficiency, as the hydrocarbon fuel does not have to be heated from as low a temperature as is required in the conventional forms of carburetion.

The present moisturized and vaporizer enables water vapor in minute quantity to be directed into the barrel, or barrels, of the carburetor in heated, vaporized form on the suction side of the venturi jet so that water vapor, hot exhaust gases, and atomized hydrocarbon gas vapor will be intimately mixed to give an increased supply of oxygen into the mixture over that of atomized hydrocarbon vapor, which enables more complete combustion to be produced to give more effective power out of the hydrocarbon fuel consumed, and with less residual soot and tars, consequently enabling the engine to be freer of carbon deposits, sludge, gums, and the like.

While the present drawing discloses the use of the device in only a single barrel of a carburetor, it is to be understood that like injection devices can be installed on multiple barrels with one unit going to each barrel, thereby giving uniform proportioning of moisturized and heated water vapor into each barrel of a carburetor on which it is desired to be used.

The present device is so constructed that it normally does not need any regulation once it is installed, however, provision is made to disassemble the unit in such manner that it may be readily cleaned and re-assembled if cleaning should become necessary. Furthermore, provision is made to enable the adjustment of the water level in such manner as to give the best performance at the particular altitude at which the device is operating.

An object of this invention is to provide a device for injecting water vapor into the suction system of an internal combustion engine, which water vapor is to be mixed with hydrocarbon fuel vapors to promote the combustion of the products of combustion being fed into an internal combustion engine.



Another object of the invention is to provide a system for introducing water vapor into the air stream of a carburetor of an internal combustion engine intermediate the venturi of the carburetor and the combustion chamber thereof, so as to admix water vapor with a hydrocarbon vapor in proportion to the suction within the carburetor barrel leading to the combustion chamber.

Still another object of the invention is to provide a system for introducing heated water vapor into the air stream of a carburetor which will dispense a uniform quantity of water from a reservoir until the reservoir becomes empty, without using valves to control the dispensing of the water.

A further object of the invention is to provide a system for introducing a mixture of hot exhaust gases and water vapor into a carburetor of an engine to enable the reburning of any unburned hydrocarbons in the exhaust gases to enable the reduction of carbon monoxide from the exhaust of an internal combustion engine.

And still a further object of the invention is to provide a system for introducing heated water vapor into the air stream of a carburetor which is low in cost of manufacture, dependable in use, and which effectively raises the oxygen content of the effective combustible mixture from a carburetor, which enters the combustion chamber.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings in which like reference numerals designate like parts in the several views thereof, in which:

FIG. 1 is a view partly in perspective, partly in elevation, and partly in section with portions enlarged to bring out the details of construction of an internal combustion engine having intake and exhaust manifolds thereon, a longitudinal, sectional view through a carburetor casing showing a portion of the carburetor on which the present invention is attached and showing diagrammatic piping leading from the exhaust manifold thereto and from the water supply tank and the water level tank, with portions broken away and shown in section to bring out the relation of the various parts;

FIG. 2 is a longitudinal, sectional view through the water level control tank with parts shown in elevation; and

FIG. 3 is a longitudinal, fragmentary, sectional view through a barrel of a carburetor showing a modified form of the invention installed therein:

With more specific reference to the drawing, the numeral 1 designates generally an internal combustion engine having exhaust manifold 2 and an intake manifold 4. A carburetor desigated generally by the numeral 6 is shown mounted on the intake manifold 4, which carburetor for sake of clarity is shown in greatly enlarged proportion with respect to engine 1 and water supply reservoir 8, however, the specific working parts of the carburetor not associated with the invention have been deleted as the present carburetor is merely representative of a carburetor utilizing a conventional venturi. The numeral 8 designates a water supply reservoir with a pressure tight fill cap 10 secured to a neck 12 to enable filling the water supply reservoir 8 with water. While the water supply reservoir 8 has been shown to be square, the shape is immaterial so long as a water outlet pipe 14 is provided therein near the lower side thereof, which water outlet pipe 14 connects with water level control tank 16. A valve 18 is provided within water outlet pipe 14 to enable the closing of the water outlet pipe 14 when filling the water supply reservoir 8 with water. An open end, adjustable

water level control pipe 20 extends downward through the cover 22 of water level control tank 16. A packing gland 24 is secured to cover 22 and surrounds the open end, adjustable water level control pipe 20, and leads to and through the top 28 of water supply reservoir 8, and is in fluid tight communication with the water supply reservoir 8. The upper end of the pipe 30 is curved and extends above the top 28 of water supply reservoir 8, so as to prevent any water from passing therethrough when the water supply reservoir 8 is filled, and while the present drawing shows only a minimum extension of curved pipe 30 above the top 28, it is to be understood that this may be several inches or even a foot or more, if desired. A flexible joint, such as a hose 32, is provided within the length of pipe 26 so as to enable quick detachment if it is desired to renew water level control tank 16 and to lessen the liability of breaking the pipe due to vibration. A further pipe 34 extends above the cover 22 of water level control tank 16 and is open to atmosphere, and preferably has the open end downturned as indicated at 36 to lessen the possibility of the opening in the pipe becoming clogged with foreign substances, grease, and the like.

A water outlet pipe 38 extends through the cover 22 and is surrounded by a packing gland 40 which is secured to the cover 22 of water level control tank 16 so as to form a tight joint therethrough. The lower end of pipe 38 is preferably cut on an angle, as indicated at 42, to prevent the open end of the pipe from resting on the bottom of water level control tank 16. The pipe may be adjusted upward by loosening packing nut 41 or may be removed for cleaning or renewal, if desired. The pipe 38 leads to and extends into pipe 44, which is of larger diameter and which conducts exhaust gases from exhaust manifold 2 into a distribution manifold 48. An upper pipe 50 leads from distribution manifold 48 into the barrel 52 of carburetor 6 at the most constricted point of the venturi 54. A large lower pipe 58 leads into the barrel 52 of the carburetor 6 at a point therebelow where the barrel 52 is of enlarged diameter and where the gaseous vapor flowing therethrough is not of the velocity in the constricted portion or venturi 76. At low speed more exhaust gas is pulled into the venturi 54 by the large lower pipe 58, which will enable any unburned gases therein to be passed through the combustion chamber a second time. However, at high speed the upper pipe 50 draws in water to form vapor and exhaust gas, which is mixed with the fuel vapor and thence into intake manifold 4 to be consumed by the engine.

It is to be pointed out that the arrangement of pipe 38 entering into pipe 44 draws water by suction from the lower portion of water level control tank 16. The water level in the water level control tank 16 is maintained at a level as indicated at 17 in FIG. 2. As the water level control tank 16 is opened to atmosphere by the curved pipe 30, which allows the atmospheric pressure to be maintained on the surface of the water, and since pipes 20 and 26 are connected in air tight relation with water supply reservoir 8, the water seal on the lower open end of pipe 20, which is enlarged with respect to pipe 38, will permit water to pass from water supply reservoir 8 through water outlet pipe 14 into water level control tank 16 only when the water level 17 reaches the lower open end of pipe 20, which will permit air to enter through pipe 34 and pass upward through pipe 26, which will permit water to flow from water supply reservoir 8 into water level control tank 16 until a liquid seal is formed with the lower open end of pipe 20. It is readily apparent that the variation of the water level 17 is negligible from a full water supply reservoir 8 until the water level in water supply reservoir 8 reaches a common level with the level in water level control tank 16.

Through much experimentation it has been found that if the water supply which feeds the water into the manifold to be vaporized is not maintained at a constant level, flooding with water will occur at times and there will be insufficient water at other times to provide the desired amount of water vapor. With the present arrangement, water is maintained at a given level, within closely prescribed limits, without using a single moving part or a valve which is actuated by the water level. This enables trouble free operation over long periods of time if water which is comparatively free of impurities is used.



The cap 10 is of the conventional radiator cap type, which is known as a pressure seal cap and which will prevent entrance of or escape of air within the limits of the setting of the cap pressure release.

While the sizes of the pipes 38 and 44 may vary within limits in accordance with the suction created within the carburetor 6, it has been found that the water outlet pipe with an internal diameter of 1/16 inch performs satisfactorily. A pipe of 1/8 inch internal diameter to conduct the exhaust from manifold 2 to the distribution manifold 48 is satisfactory. And while pipes 50 and 58 are shown enlarged with respect to pipes 38 and 44, for the sake of clearness, with respect to the enlarged view of the carburetor 6, the upper pipe 50 preferably is about 1/16 inch internal diameter and the lower pipe 58 is approximately 1/8 inch in internal diameter. The present arrangement is found to moisturize and vaporize the water for admixing with the products of combustion.

*Modified Form of Invention*

A modified form of the invention is shown in FIG. 3, which utilizes the same water supply reservoir 8 and water level control tank 16 as shown in FIG. 1. However, the present form of the device does not utilize a distribution such as manifold 48. The present device has a water pipe 71 passing through a wall of the carburetor 6 into the barrel 52. The inner end of the water pipe 71 is closed as indicated at 72, and a small hole 74 is provided in the upper wall of water pipe 71, which hole 74 is substantially in axial alignment with venturi 76. A larger hole 78 is positioned in transverse axial alignment with the venturi to permit the escape of water as vapor from water pipe 71. In this form of the invention the exhaust gases are brought into the barrel 52 of the carburetor through a pipe 80 below the venturi 76. The exhaust gases entering through pipe 80 heat the hydrocarbon gas mixture and water vapor before the mixture enters the intake manifold 4. Valves (not shown) may be provided on each of the water pipes 71 and 80 to close these passages, if desired, thereby enabling either to be used or both to be used at the same time. The form of the invention shown in FIG. 3 has substantially the same characteristics as the form shown in FIGS. 1 and 2, that is, at low speeds more exhaust gas is pulled into the carburetor barrel 52 below the venturi 76 and at high speeds the butterfly valve 82 will be open to a greater extent and more water will be pulled in through water pipe 71 to be vaporized. The velocity of the air at this point is greater and will create a greater suction on water pipe 71.

By introducing water vapor or water vapor and hot exhaust gas into the barrel of the carburetor with the hydrocarbon fuel vapors, the gas is heated and mixed into a homogeneous vapor which causes the vapors to be more thoroughly atomized and it is believed that the molecules of hydrocarbon fuel are broken down more thoroughly, which produces a more readily combustible mixture of hydrocarbon fuel, which enables a substantial saving on fuel or more power with the same amount of fuel than would be consumed, were the present system not installed in the carburetor.

Having thus clearly shown and described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A device for use in combination with an internal combustion engine to provide a combustible mixture, which device comprises:

(*a*) an air tight reservoir,

(*b*) a water level control tank,

(c) conduit means connecting said reservoir with said water level control tank to enable water to flow from said reservoir to said water level control tank,

(d) said water level control tank having an opening formed therein, which opening is above the normal water level,

(e) a pipe extending into said water level control tank,

(1) the lower end of said pipe being open,

(2) said pipe being spaced from the bottom of said tank,

(f) a conduit leading from the upper end of said last mentioned pipe and being connected in fluid tight relation with the upper portion of said air tight reservoir, and

(g) a water outlet conduit leading from a point near the bottom of said water level control tank to a barrel of the carburetor of said internal combustion engine and being in open communication therewith at a restricted point in the barrel of said carburetor.

2. A device for use with an internal combustion engine as defined in claim 1; wherein

(a) said pipe which extends into said water level control tank is of relatively large diameter,

(1) which pipe interconnects with said conduit which leads to the top of said tank,

(b) said conduit being of smaller diameter than said pipe which extends into said water level control tank.

3. A device for use with an internal combustion engine as defined in claim 2; wherein

(a) said conduit which leads from said enlarged pipe extends to a point a spaced distance above the top of said tank.

4. A device for use with an internal combustion engine as defined in claim 1; wherein

(a) a conduit connected to said water level control tank, which conduit extends upward therefrom and is in fluid communication with said opening formed in said water level control tank, the distal end of which conduit is downturned.

5. A device for use with an internal combustion engine as defined in claim 2; wherein

(a) said enlarged pipe is vertically adjustable, and

(b) gland means is provided to maintain a gas tight seal around said pipe.

6. A device for use with an internal combustion engine as defined in claim 1; wherein

(a) said water outlet pipe is vertically adjustable, and

(b) gland means surrounds said pipe to prevent entrance of air into said water level control tank.

7. A device for use with an internal combustion engine as defined in claim 1; wherein

(a) the exhaust manifold of said internal combustion engine has a conduit which leads therefrom and to a barrel of the carburetor of said internal combustion engine, and

(b) said water conduit interconnects with said conduit leading from the exhaust manifold to permit entry of water thereinto.

8. A device for use with an internal combustion engine as defined in claim 7; wherein

(a) a manifold, which has at least two outlet openings,



is positioned on the carburetor of said internal combustion engine,

(1) one of said outlet openings being connected by a conduit with a barrel of the carburetor of said internal combustion engine at the most restricted point therein,

(2) the other of said openings being connected by a conduit to a barrel of said manifold,

(b) which conduit enters said barrel of said manifold at an enlargement therein, and

(c) which enlargement is intermediate the constriction in said barrel and the intake manifold of said engine.

9. A device for use with an internal combustion engine as defined in claim 8; wherein

(a) said outlet conduits which connect with a barrel of the carburetor of said internal combustion engine have a differential in size,

(1) with the smaller conduit entering the most constricted portion of the barrel of the carburetor, and

(2) the conduit of larger diameter entering the barrel of the carburetor of said internal combustion engine at an enlargement in said barrel intermediate said constricted portion thereof and said intake manifold.

10. A device for use with an internal combustion engine as defined in claim 7; wherein

(a) the water pipe which leads from said water level control tank is of smaller diameter than the pipe which leads from the exhaust manifold of said internal combustion engine to a barrel of the carburetor thereof, and

(b) said water inlet pipe entering said pipe leading from said manifold from approximately the same direction as the direction of travel of exhaust gases from the exhaust manifold, so as to heat said water as said exhaust gases are re-cycled through said pipe which leads from said exhaust pipe back to the barrel of said carburetor.

11. A device for use with an internal combustion engine as defined in claim 1; wherein

(a) said pipe which leads from said water level control tank extends into a barrel of said carburetor at a restricted point therein,

(1) the end of which pipe which extends into a barrel of said carburetor being closed,

(2) said pipe having an opening formed transversely therethrough, and

(3) said pipe extending inwardly and being positioned within the line of draft of the gases which pass through the barrel of the carburetor.

12. A device for use with an internal combustion engine as defined in claim 11; wherein

(a) said transverse opening through said water supply pipe is of lesser diameter on the high pressure side than on the low pressure side.

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