

Panacea-BOCAF On-Line University

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Overview.....

Water mist injection.....

Fuel vaporization devices.....

Credits.....

Caution: This document is for information Purposes only. If you apply or use any of these ideas, you do so entirely at your own risk. Neither the designer of the system, author of this document or provider of the internet display are in any way liable should you suffer any loss or damage trough your own actions. While it is believed to be entirely safe to apply the ideas provided that safety, proper skills and knowledge is applied, further intensive research on details of idea is suggested, it is stressed that the responsibility is yours and yours alone.

Overview

There are many ways to improve fuel economy by the vaporization of fuel. These systems include:

Fuel Vaporizers - systems that use cooling system, exhaust or electric heat

Reformed Fuel - inject hot exhaust gases directly into fuel for vaporization (very effective) GEET technology

Catalytic - use a catalyst (generally platinum) to break fuel into smaller particles

Fuel and Water/Steam or Hydrogen Conversion - use water with fuel (many claim to produce hydrogen gas)

Sonic - use sonic frequencies to disrupt fuel molecules (also effective, especially with heat)

FI (Injected), Radiation, Alternate Fuels, Etc. - other categories that hold great promise

There are up to 927 patents for these systems which have never made it to the light of day. Holders of these patents have not released or manufactured this technology

as of today 2009. For a complete reference of these patents please refer to the [fuel vaporization page](#) in the energy suppression section of the Panacea site. The internal combustion motor is inherently inefficient and polluting by design. **Fuel vaporization or reforming “add on” technology is needed to save energy and stop pollution.**

Given the efficiency reports by the following modifications, it is recommended that you use at least one of the following suggestions to perform mandatory corrective surgery to your ICE for better efficiency and for a reduction in pollution.

Modifications:

Water mist injection,

[GEET](#), technology

[hydroxy](#) technology

Given the efficiency reports of the water mist injection, [GEET](#), and [hydroxy](#) add on modifications this technology is an invaluable power management process which the mainstream faculties must benefit from. **As an emission cutting device and power savings device alone, this technology justifies (and needs) law for its mandatory implementation.**

The Non profit organization Panacea-BOCAF intends to support open source engineers working with the GEET and other suppressed clean energy technologies. These engineers require grants, resources, faculty recognition and security. All this can be created in [Panacea’s proposed granted research and development center](#). For those able to help this effort, please [Contact us](#).

Water Mist Injection

Water injection was first used in the 70’s to help control detonation on turbocharged and supercharged cars, by lowering intake temperatures. This same method can be applied to your modern day car, with modern day pumps, electronics for a safer turbocharged car when you’re running higher boost levels, or you want to lower intake temperatures on your car.

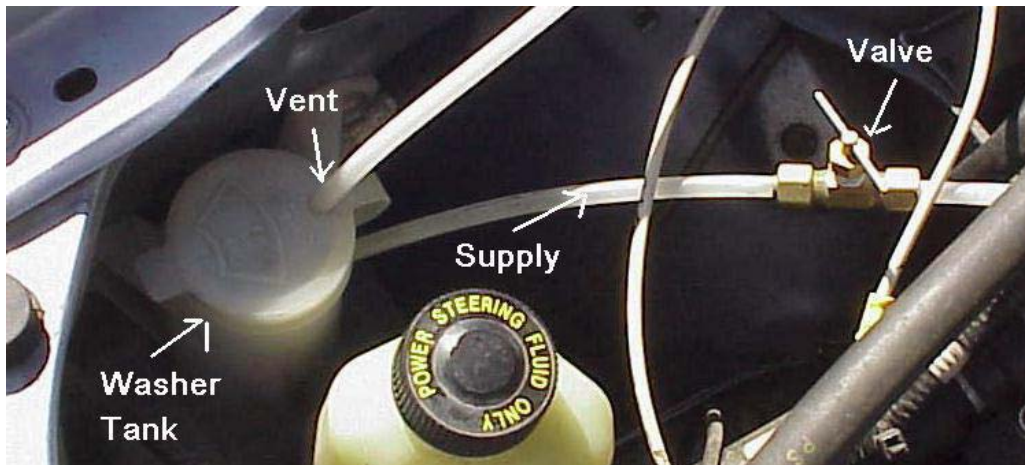
Using water vapour drawn into the engine along with the air will transform into steam at the moment of ignition. This will then expand (heat to pressure) and provide an additional thrust to the pistons. This operation will also lower the engines running temperature.

A Mileage increase **can be simply achieved by injecting plain tap water** and turning it to the finest mist. This can also work well in a 4 stroke Otto engines air intake. This LOWERS the needed force for COMPRESSION (saves energy there), and at the explosion of fuel and at the expansion (power stroke) water becomes vaporized, allowing a higher pressure gradient towards the piston, thus exhaust air will be colder

than normal. Using water injection additionally to a [hydroxy](#) explosion can be useful for cooling the engine and increasing plain hydroxy production.

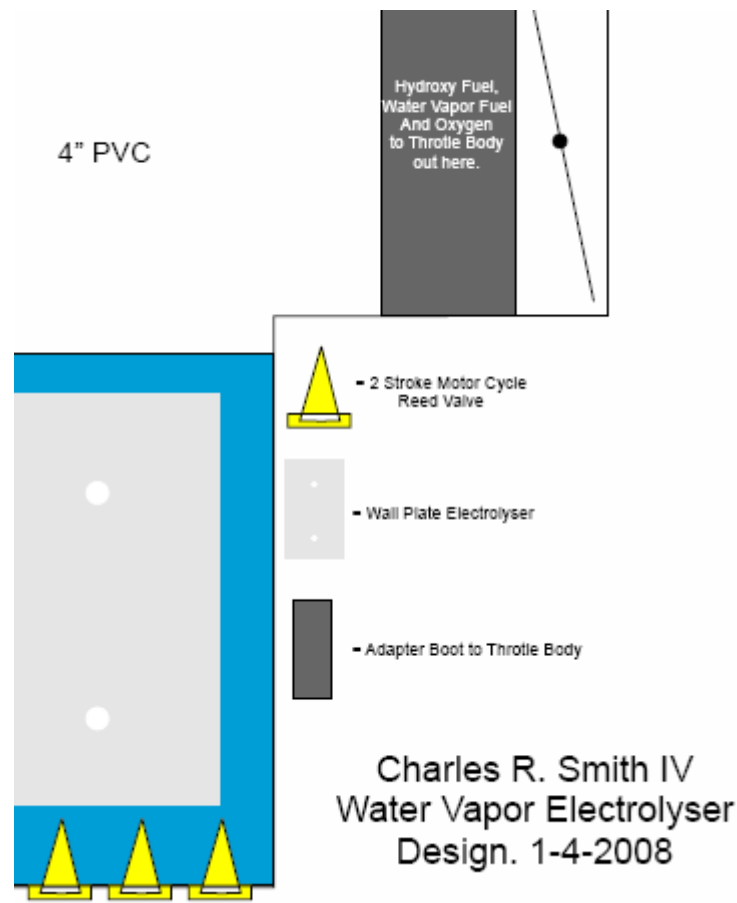
Simple Water Injection System by Gerry Langwell

This will describe a simple water injection (suction) system using the windshield washer tank as a reservoir and modifications to the throttle body. A few benefits of using the washer tank is you don't have to find room for another tank and if you use washer system antifreeze it will contain a small amount of methanol, so now you will have water/methanol injection. This system uses no pump and relies on engine vacuum to draw water into the throttle body. With the throttlebody modifications described below the engine should not draw water at idle but will begin to draw water as the throttle is opened.



[PDF Download- Simple Water Injection System by Gerry Langwell](#)

Charles R. Smith IV Water Vapour Electrolyser Design



Note – not tested yet. This design is intended to be operated with a hydroxy booster. With this simple design the engine would take all the Hydroxy that the Electrolyser unit can produce at very high amperage. The reed valves would hold in the water but under a vacuum air coming in through them would not only create bubbles for water vapour but would also cool the water and plates and knock off the bubbles from the plates allowing them to produce more Hydroxy.

[PDF Download - Charles R. Smith IV Water Vapour Electrolyser Design](#)

Roger Maynard's simple system

This example of water injection shown is Roger Maynard's simple device. Roger has had a lot of experience regarding these systems and has tested them to ensure they work reliably. Roger has operated these units like these since 1978.



The above unit will be installed into to the air intake of the vehicle. This will be between the air filter and the engine. It is as simple as using a small diameter plastic pipe attached to the air intake into a glass or plastic container containing water. In the picture below, Roger's is showing a glass Mason jar, he has used a screw-on metal lid as a seal.



The design enables the air to get feed into the jar by plastic piping. At the end of the piping Roger has attached a [standard air-stone](#) to create a large number of separate bubbles. You can find this product in a home aquarium system.



[DIY Air stone](#)

You are able to glue the plastic fittings to the lid of the jar; however you must not make the jar too airtight. If you have made the jar too air tight, try and remove the rubber seal which is around the neck of the jar. It has been reported that some engines are suited to the use of the air-stone and some are not. Also in the case of a smaller engine, you can experiment with the use of a stainless steel screw in place of the air-stone for efficiency.



Air stone creating bubbles

It has been reported that some engines are suited to the use of the air-stone and some are not. Also in the case of a smaller engine, you can experiment with the use of a stainless steel screw in place of the air-stone.

Water Mist Links

[2nd Generation Water Injection System](#)

[Gasoline Vaporization Using A Modified Stock Carburetor](#)

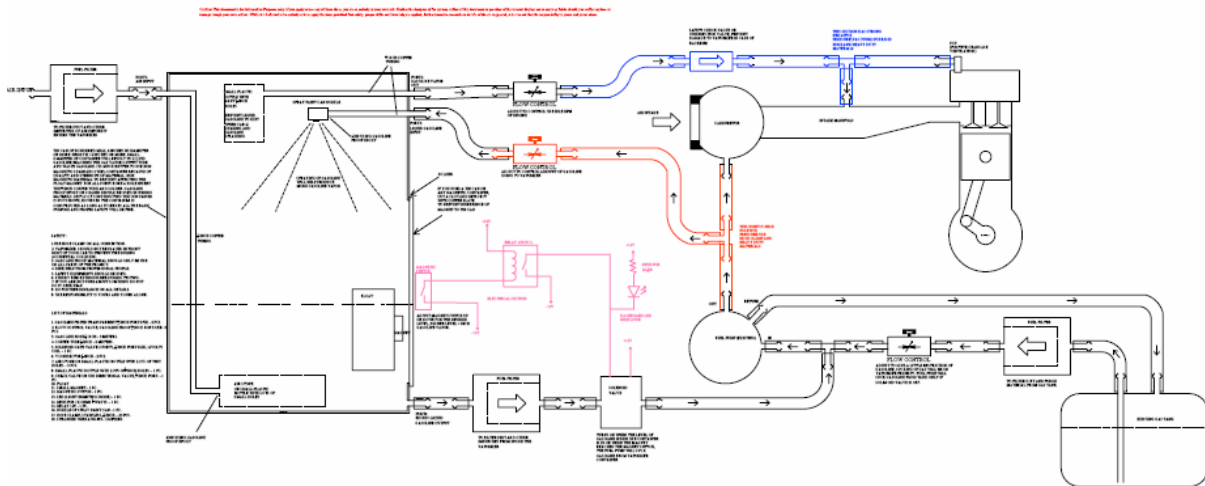
Video - [Steam injection test on Saab 900 Internal combustion engine](#)

Fuel vaporizers

There have not been many open source ones disclosed over the years, one of the most detailed is shown in the Alan Francoeur "[ALF Vapour Carburettor](#)". Another system will be described. For a complete look at the patents and other systems (which may not reveal the whole picture) please refer to the Panacea web page on suppressed fuel vaporization research. The following is an EXPERIMENTAL hybrid of hydroxy and fuel vaporization systems.

Project Genesis by Jo - [Email Jo](#)

PROJECT GENESIS



[Project Genesis PDF](#)

[Videos of the system installed](#)

It is recommended you check the GEET and Hydroxy courses on the Panacea university site for more fuel reforming and energy saving modifications.

Gasoline Vaporization Using A Modified Stock Carburetor

The following is an article by George Wiseman and Geoffrey Tilga reproduced here at Geoffrey Tilga's request and with Geoffrey Tilga's written permission dated 02-Apr-1998. This has been backed up here and [taken from this website](#).

Use only with unleaded gasoline containing no 'detergent' or other additives." (i.e. 'white' gasoline)

From: Tesla, A Journal Of Modern Science., Available with membership in International Tesla Society, 2220 East Bijou Street, POB 5636, Colorado Springs, Colorado 80931 USA Telephone: 719-475-0918, 1-800-397-0137(USA), FAX: 719-475-0582. US-\$30/yr., \$40/family, \$55/Corporate, Other \$55. Mastercard, Visa, American Express Cards accepted. Tesla, Third Quarter, 1997 vol VIII, Number 3. Pages 8-15 Article: "Gasoline Vaporization Using A Modified Stock Carburetor" by George Wiseman and Geoffrey Tilga.

Atmospheric pollution from gasoline motor exhaust is created by unburned hydrocarbons. These pollutants are largely caused by the fact that gasoline is not totally vapourised by the conventional carburetor system. In any carburetor, gasoline is broken down into droplets or particles and vapor. It is the vapor that explodes and powers the internal combustion engine. The droplets pass through the exhaust system as unburned or partially burned hydrocarbons, i.e. pollution. Gasoline can be vapourised more completely by the use of heat and/or a mechanical action. If the light ends (i.e., fractions of gasoline that evaporate below 250 degrees

Fahrenheit) are vapourised, there is a corresponding decrease in exhaust pollution and an increase in the efficiency of the engine.

The use of heat and/or mechanical action to improve the amount of gasoline vapourised was documented in The Scientific American Digest[1](brackets[#]=footnote). This finding has been replicated on modern stationary gasoline engines in the Houston, Texas laboratories of the Shell Oil Company[2]. In the Mills patent, for a device he calls the 'Vapiper', Mills concludes: "The use of vapourised fuel enables a gasoline engine to be run on such lean mixtures, even in excess of 20:1 air to fuel ratio, that the levels of carbon monoxide and oxides of nitrogen are simultaneously low, thereby contributing to the abatement of environmental pollution[3]". Is it coincidental that Shell Oil Company scientist Geoffrey Harrow of Wales, UK in his patent "Device For Vapourising Fuel" makes the identical claim in exactly the same words[4]? For further reference material on the Mills patent, SAE Paper 760564 is cited[5].

The late Ray Covey, who used the Carburetor Enhancer Method along with the heat exchanger described here, was also awarded a patent for a vapouriser carburetor #4,611,567 using exhaust heat to evaporate gasoline. This vapouriser patent was originally assigned US Patent Class 123, Subclass 545 A computer search of all vapouriser patents in this subclass back to 1900 yielded over five hundred patents! The reader can access all patents granted after 1976 at www.upsto.gov on the US Patent Office database, through the Internet. Go to 'Search Patents' Use Covey's Patent number 4,611,567 proceed to 'References Cited', and explore from there. After 17 years from its publication in the Official Gazette, a patent falls into the 'public domain', the inventor loses all property rights over their idea. There is no longer any economic or legal incentive to defend the patent. Contacting the inventors of expired patents would perhaps be very helpful to readers wanting to improve the design discussed here. The address of an inventor can be obtained through the US Patent Office. Construction plans for the Covey patent will be fully described in a future issue of Tesla.

There are several systems that will work in fuel injected engines to more completely vapourise the fuel, resulting in a higher efficiency. Inquire further about them from George Wiseman. These are:

"HydroCarbon Oxygenator(HyCO) 2A cold vapor system" An add-on vapor fuel system for carbureted and fuel injected gasoline engines, complete with automatic controls that allow the vapor system to interface perfectly with the original fuel system.

"HyCO 2DT" A special cold vapor system for turbo-charged diesel engines. Simple and very effective.

"Electronic Fuel Injection Enhancer (EFIE)" An electronic device needed by fuel injection systems that have oxygen sensor feedback to allow simple combustion enhancement methods to interface with the vehicle's computer.

"Electronic Diverter" An electronic device that gives total control of the electronic fuel injectors to the driver. Automatic fuel control needed when applying a major combustion enhancement device like the HyCO 2DT. Designed to interface smoothly with all electronic fuel injection systems.

The CEM was not patented, it is in the public domain. It was originally invented by George Wiseman. Full a full discussion of the Carburetor Enhancer Method and instructions to make it operate under all conditions, order inventor George Wiseman's book "Carburetor Enhancer Method" catalogue number 240002 from the International Tesla Society. The cost is: \$20.00. To place an order, FAX 719-475-0582, or call 1-800-397-0137 (719-475-0918 outside the USA.) Mastercard, Discover, and Visa credit cards accepted.

"Carburetor Enhancer Method" can also be ordered directly from the inventor George Wiseman. The cost for " Carburetor Enhancer Method" is \$20.00. Postage is \$2.00 for the US, \$7.00 for foreign addresses. Also, "Super Gas Saver Secrets" by George Wiseman, cost: \$20.00, \$2.00 postage for USA, \$7.00 for outside of US.. There is a set of notes that will enable a further improvement in this technology: "Electronic Carburetor Enhancer Notes" . The cost of this folio is \$10.00 from George Wiseman with \$2.00 postage anywhere in the world. Order from: Eagle Research, PO Box 1852, Eureka Montana 59917.

In a stationary engine, such as an irrigation pump or gasoline electric generator, the CEM used with the heat exchanger can drop fuel consumption from two thirds to one half of what it was before the modification. In 1989, inventor Ray Covey experimented with the CEM in motor vehicle applications; but this is illegal (a Federal offense) in the USA today. Under EPA regulations, special permission to run an experimental vapor carburetor system in a licensed motor vehicle is required. This is very difficult for a private individual to obtain.

Refer to Figure One, Figure Two and the Parts Description. The number in (brackets) following a statement refers to the individual callout for each illustration.

Gasoline must be in a vapor state to burn and explode. Only gasoline in a vapor state when the spark plug fires actually drives the engine. All liquid droplets of gasoline vaporize during the primary explosion and burn in a secondary explosion. The secondary explosion happens after the piston is already moving faster than the speed of the combustion, this is wasted fuel.

The Carburetor Enhancer Method increases the efficiency of carburetors by putting a controlled vacuum into the float bowl. .A controlled vacuum applied in this exact way will cause the carburetor to spray out a finer mist of fuel, thus increasing the fuel evaporation rate. This vaporization increases combustion efficiency. Further, when using the Carburetor Enhancer Method with the gasoline preheater (as shown in Figure Two), the lower pressure on the float bowl causes more of the heated fuel turn

to vapor, thus also increasing combustion efficiency.

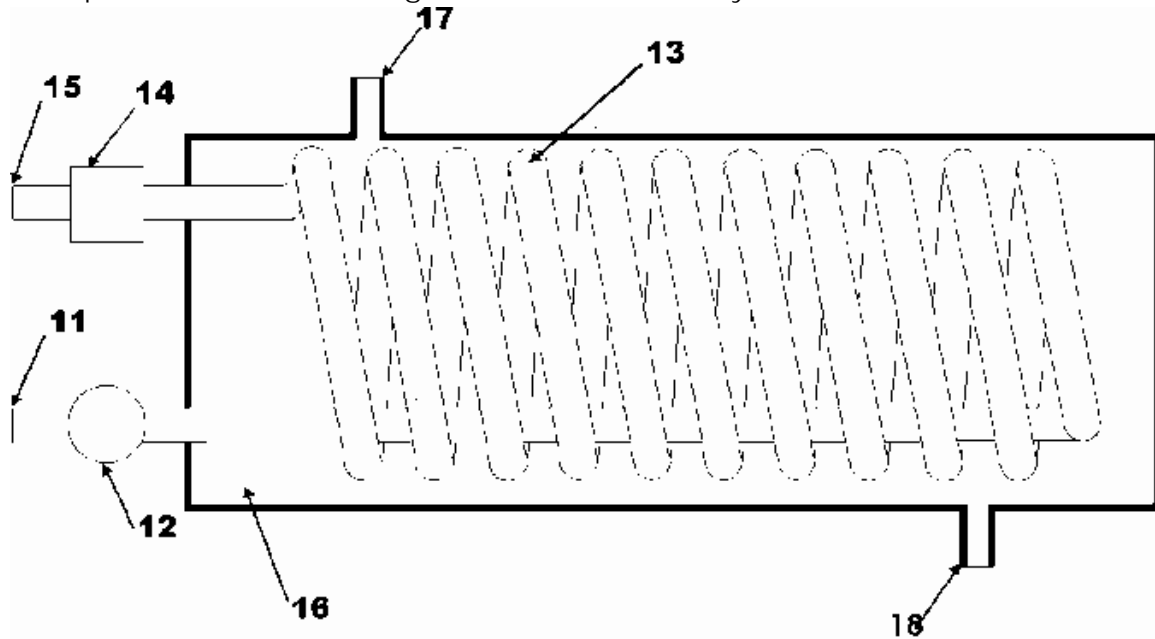


FIGURE TWO

?Refer to Figure Two.(FIGTWO.GIF) Preheated gasoline at a controlled temperature-[for example 150 degrees Fahrenheit], exits (11) and enters Gasoline Inlet in Figure One. For a detailed technical explanation of the Fuel Preheater Illustrated in Figure Two, refer to US Patent 4,083,340[6].

?If this is used, the float in the Float Bowl of the Carburetor in Figure One must be made of copper or brass. These floats can be purchased at local automotive supply stores. Plastic floats will disintegrate.

?PressureRegulator(12) is set to 3 1/2 pounds per square inch. This pressure regulator is a variable 1-5 1/2 pound (psi) Adjustable Pressure Regulator. Purolator Fuel Pressure Regulator #73NZ8053T. \$18.95 JC Whitney[7].

?One Way Check Valve (14) can be purchased at any plumbing supply. Or: W.W. Grainger Bronze Air Check Valve 1/4 inch outlet, flow rate =1 to 6 cubic feet per minute. Part #5A-703. Inquiry: www.grainger.com

?The Fuel Preheater [16] must be configured to bring the temperature of the gasoline to 150 degrees Fahrenheit at exit point (11), where it goes to the Gasoline Inlet in Figure One. This can be raised to 160 degrees Fahrenheit, but such an increase in temperature may cause vapor lock. For some carburetors, this temperature may have to be adjusted down to as low as 120 degrees Fahrenheit to prevent vapor lock. The mechanic will have to experiment. Whatever fuel pre heater is used, the output temperature of gasoline must be controlled by the person using

the engine. In different seasons and at different altitudes, different temperatures are required. Adjustable thermostatic controls are simple to add to a heat exchanger. An adjustable temperature controlled switch like an electric oven thermostat, a relay and a solenoid to shut off the water flow are all that is needed. George Wiseman details a simple, easily built, fully automatic heat exchanger in his "Super Gas Saver Secrets" book.

?Radiator water circulates in(17) and out (18) Tubing (13) is inch brass or copper.

?One option that can be purchased is the Webb Fuel Heater. It is made by Webb Enterprises, Inc. 320 8th Street West Fargo, North Dakota 58078. Telephone number: 701-281-0002. Or: (800)-728-9322[inUSA] The Webb Fuel Heater is a radiator coolant heat exchanger only. It does not contain an electric preheater. The part number is #W8791. Suggested price is: \$102.61. Since these are employed commercially to preheat the fuel oil for diesel trucks, a used unit could be found on a wreck . Adapter fittings are needed to accommodate these units to inch line(11),(15). They can be obtained from: Brass Fittings, Inc. 26377 Moses Street. Flat Rock, MI. Telephone: 313-782-1477.

A simple description will be given of the "Basic" installation of the Carburetor Enhancer Method (CEM) invented by George Wiseman. Refer To Figure One and Figure Two with the Parts List which follows. Use this information to follow the Installation Instructions.

The Carburetor Enhancer is a simple external method to significantly increase the efficiency of gasoline engine carburetors.

Read these instructions carefully before applying the Carburetor Enhancer method.

Once installed and adjusted, its operation is automatic. Use the engine as it would normally be utilized.

The purpose of this article is to provide the simplest instructions to apply the "Basic" Carburetor Enhancer. The Carburetor Enhancer Manual goes into more detail. Inventor George Wiseman wrote this to (hopefully) assist retailers and show how simple the basic installation and adjustment really are. " If you know what a carburetor looks like, you can do it." The Enhancer can be used on most downdraft carburetors.

The Carburetor Enhancer method is not recommended for:

Any type of fuel injection, (no place to apply it)

Computer controlled carburetors, (some of them already have it)

Motorcraft 2700 variable venturi, (has no air bleeds)

Side or Up draft carburetors (have no air bleeds)

Carter BBD models, (requires modification to accelerator vent).

Installation of the "Basic" Carburetor Enhancer

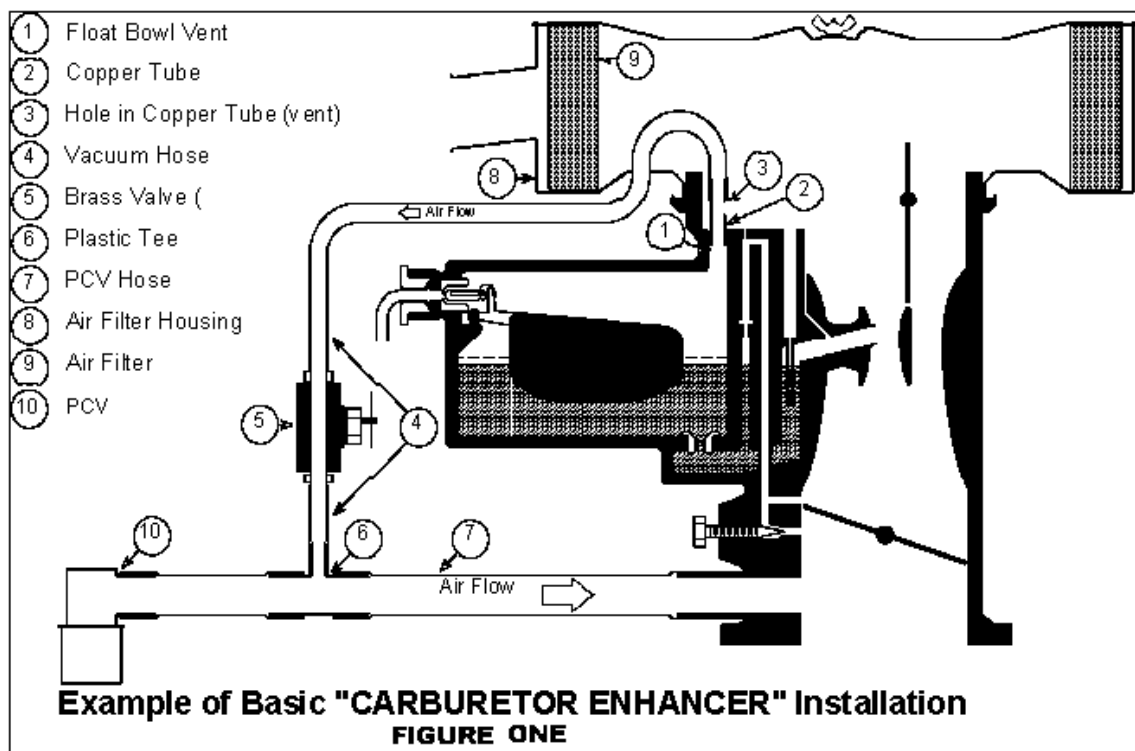


FIGURE ONE See:(FIGONE.GIF) enclosed.

Tools required to install and adjust the " Basic" Carburetor Enhancer;

Knife

"Chainsaw" file.

Finetoothed hacksaw/tubing

cutter

Hammer and center punch

25/64th inch drill bit

1/8 inch drill bit

3/8 inch drill bit

Vacuum/pressure gauge

Colortune (optional)

9/16 open end wrench

7/16 box end wrench

Medium slotted head screwdriver

Tachometer

The Carburetor Enhancer "Basic" kit includes;

A piece of clear 1/4" vinyl tubing

A short piece of 1/4" fuel hose

A 4" piece of 1/4" copper or brass tubing

A 1/8" FNPT brass valve

[Female National Pipe Taper]

Two 1/8" MNPT to 1/4" barbed fittings [Male National Pipe Taper]

A plastic tee, 3/8" x 1/4" x 3/8" [a brass tee can also be used.]

A 18" length of 1/4" vacuum hose

STEP 1 Tune Up FULL TUNE-UP: For maximum efficiency, it is recommended that the engine be tuned up, any external drive train be checked out. .

STEP 2 Test carburetor (recommended option)

TEST-CARBURETOR & CLEAN; There is no way to stress enough that the most important part of a rebuild is to get everything perfectly clean. In our experience, a bit of dirt or varnish left behind will cause grief by plugging or reducing the size of orifices in the carburetor, especially air bleeds. A lot of mechanics simply "slap a kit in". When looking for someone to rebuild the carburetor, find an individual who will take the time to do the job properly. Wash the carburetor with an agitated acid bath, then spray with basic carburetor cleaner, then wash with dish soap and water, rinse with warm water and blow dry with air. Make sure all varnish is cleaned from all orifices.

LEAKS: A lot of Rochester and Carter Quadra-jet carburetors have leaky secondary well plugs. It is possible to seal them with a gasoline compatible epoxy like JB Weld or Loctite Weld; but the metal surface must be cleaned to bright shiny metal. It took the inventor George Wiseman three tries to seal one particular Quadra-jet. Then the fuel efficiency of this carburetor was doubled. Some companies sell a "plug kit" to fix this particular problem, an example is the Hygrade QJK1 for 1965-68 Quadra-jets and the QJK 2 for 1969-74 models.

FLOAT: Replace plastic floats with brass or copper ones. Hot gasoline vapor will cause plastic floats to disintegrate.

FILTER Diesel type inline fuel filters are recommended. The smallest particle of dirt in the needle valve, power valve, accelerator check valves, etc. may cost gallons of fuel and increase harmful emissions.

FLOODING: If vapors are noticed wisping out of the air horn, or a varnish buildup is seen on the air horn and choke plate area; then it can be assumed that there is float bowl flooding. Vapor wisps could also be caused by gasoline leaking through voids in the carburetor and inadequate float bowl venting.

MARGINAL FLOODING: Float bowl flooding is the most common cause of lack of carburetor efficiency. Float bowl flooding costs gasoline engine users millions of dollars per year. The CE inventor George Wiseman has seen float bowl flooding so bad that gasoline was pouring out the top of the vents. But the real problem lies in the marginal flooding conditions, because people never know they have a problem that needs fixing. If the float bowl fuel level in the carburetor rises one sixteenth of an inch above OEM specifications, there is float bowl flooding. The Carburetor Enhancer can not help a carburetor that has float bowl flooding until it is fixed.

REBUILT: Just because a carburetor has just been rebuilt, there is no reason to believe there is no float bowl flooding. Experience has shown that rebuilds are just as likely to have problems as old carburetors. The inventor George Wiseman has seen new inlet needle valves that were in worse condition than the old ones they're replacing.

TEST VALVE: The most often cause of float bowl flooding is a bad inlet needle valve. The inlet needle valve can be tested by using a small air pump (bicycle pump) and a pressure gauge. Make sure that the float bowl has it's proper fuel level and then apply about 10 psi to the fuel line that leads into the float bowl. Watch the pressure gauge, if it loses more than 1 psi per minute, the inlet needle valve is leaking. .

FIX IT A leaky inlet needle valve will not give the optimum efficiency on a stock or modified CEM carburetor. It must be fixed.

COLORTUNE: The tool highly recommended by the inventor is a "Colortune". Colortunes make the job quick, easy and accurate. The Colortune will instantly show the exact fuel ratio of the engine and costs less than \$50. Colortune is a clear spark plug that allows the color of the flame to be seen in the cylinder of the engine. A small change in the fuel mixture makes a large color difference. The results of an adjustment can be seen at once. This saves a lot of time because there is no "wait time"-which is required by most engine analyzers after each adjustment. Fuel system adjustment is as simple as adjusting an oxyacetylene torch, just watch the color of the flame. Time is important to those people who want to install Carburetor Enhancers quickly and reliably. Colortune comes with a diagnostic color chart and instructions. It has a full range of adapters to fit any spark plug hole. Be sure to remove the Colortune before using the engine. For more information on Colortunes, contact Eagle Research. See contact information at the end of this document.

ADJUST CARBURETOR: Set the carburetor functions to Original Equipment Manufacturer's (OEM) specifications before installing the Carburetor Enhancer. The Carburetor Enhancer method is meant to increase the efficiency of carburetors that are functioning properly, it is not a "Band-Aid" to fix problems.

TIP: Under general conditions, when a carburetor is being adjusted-the best results are obtained by keeping the throttle plates in as closed a position as possible (highest vacuum) Also, open up the idle mixture screws to get a smooth idle. A slightly richer mixture is needed at idle.

STEP 3 Find Engine Vacuum Source

INTAKE VACUUM: The Carburetor Enhancer method uses an intake manifold vacuum source to pull air out of the float bowl of the carburetor.

PCV BEST: Splicing into the Positive Crankcase Ventilation (PCV) hose is be the best technique, for several reasons. For example; the PCV is a centrally located vacuum source, so that the gasoline vapors that are drawn off the float bowl are evenly distributed to all the cylinders .If the PCV is used, make double sure that the PCV valve is working correctly and that the hose and carburetor passages are not clogged with carbon buildup. If some other vacuum source is used, be careful to choose a vacuum source that doesn't adversely affect some other engine function..

INSERT TEE: Splice the plastic or brass tee into the hose that has been chosen.

STEP 4 Find the Carburetor Float Bowl Vent/s

VENTED: All carburetors have at least one float bowl vent(1), they will not operate correctly without it. Some vents on a carburetor work better than others., for example; Quadra-jets work best when the Carburetor Enhancer is applied in the vent next to the air cleaner stud.

VENT LOCATION: Carburetors have different looking vents(1), even though they all do the same thing. The vent(1) may be a tube that sticks straight up or at an angle over the air horn. It may just be a hole or a slot that runs off at an angle from the air horn to the float bowl. Because of the nature of a float bowl vent, it will never be covered by the choke plate when the choke is closed. It will always be a 3/16 inch or larger hole. It will be inside the air cleaner area. It may be odd shaped or proceed to the float bowl at weird angles. Just remember, the function of the float bowl vent is to allow air pressure into the float bowl and vapor pressure out.

UNDERNEATH: Some people in the past have had trouble finding their float bowl vent. It does not help that many mechanics that don't know where the float bowl vents are. The irony is; the float bowl vent is so critical to the operation of a carburetor that it is just accepted as a "given" and is often not even pointed out in the drawings provided to mechanics. If the float bowl vent cannot be found, remove the float bowl cover and look at it from the bottom side. The vent usually is quite obvious.

HIGHEST: If there is a choice of vents, always go for the highest one inside the air cleaner and the one farthest from the inlet needle valve. These choices will help prevent liquid fuel from being pulled out of your float bowl. Do not use the charcoal

canister vent. In fact, check out the charcoal canister circuit to make sure that it is operating correctly.

SIZE: Large float bowl vents are not required to operate the carburetor. The amount of air required to keep atmospheric pressure in the float bowl is minute and easily enters through very small openings, such as around accelerator pump and air plate shafts. But a 1/4 inch vent is needed(3) when the engine is shut off, because the engine will begin heating the carburetor. The heat will vaporize some of the fuel in the float bowl; this vapor will create pressure (if not vented) and will "push" the fuel from the float bowl into the engine- flooding it. Carburetors that have two float bowls need an entirely separate Carburetor Enhancer mounted on each float bowl. Adjust each float bowl separately STEP 5 Route Vacuum Hose.

ROUTE: Keep in mind how the hose(4) that will be attached between the carburetor vent(1). and the vacuum source(10) is going to be routed. Figure out where the brass valve(5) will be, so that it can be adjusted with the air cleaner(8,9) installed.

. **PROBLEMS:** Going through the lower piece of the air cleaner instead of the top(8) is recommended, to prevent problems with lining up vacuum hoses and removing hoses just to check the air filter(9). Make sure there is no interference with any linkages under the air cleaner with the vacuum hose.

HOLE: After choosing a spot to route the vacuum hose through the air cleaner housing, use a hammer and center punch to mark the spot. Remove the air cleaner(8) from the engine and drill an 1/8th inch pilot hole in the housing. Then drill a 25/64th hole and clean up the edges with a file. The idea is to create a hole slightly smaller than the diameter of the vacuum hose, thereby creating an air tight seal when the hose is pulled through it.

Step 6 Attach Vacuum Hose To The Float Bowl Vent: This is really the most important step in the Carburetor Enhancer installation. Vents vary so much in design that no one method of attachment will work on all carburetors. But with a few simple suggestions, there should be no trouble experienced by the mechanic.

DEPTH It is not a good idea to stick the tube(2) very far into the vent. We have found that just inserting the copper tube(2) to about a 1/4 inch depth inside an existing vent(1) to work just fine. The fact is, if air was simply drawn across the top of the vent(1), a "balanced" vacuum would occur in the float bowl. The only reason that the hose(4) is stuck in or on the vent is to assure that the airflow is in the right place. The mechanic does not want the hose(4) bouncing all over the carburetor because of vibration of the engine. Only stick the tube(2) into the vent far enough to keep it there. The farther a tube(2) is stuck into any vent, the greater the chance of liquid fuel being sucked right out of the float bowl. The copper tube(2) doesn't have to fit tight. Remember air has to get into the float bowl as air is drawn out or too much vacuum will be created in the float bowl..

All of the suggested length of the copper or brass tube(2) does not have to be used. Extra length is provided to assist bending and for temporary splicing, cut off excess with hacksaw or tubing cutter. Clean up tube ends (ream) with a drill bit. Make sure the tube has been cleaned of metal filings.

SMALL VENT: Some vent tubes(1) are too small to stick the copper tube(2) inside. With those forget the copper tube(2) and stick the vacuum hose(4) directly onto the vent tube(1).

LARGE VENT: Some vents are so large that the copper/brass tube(2) can be forgotten, and just stick the vacuum hose(4) into it. Make sure that there is still adequate venting to prevent pressure buildup in the float bowl when the engine is shut down.

SECURE: In any case, always remember to secure the hose(4) so that it won't fall out of the vent(1). It has been found that fastening the hose to the air cleaner stud with a wire tie, will work very well. It is also a good idea to prevent sharp bends in the vacuum hose(4). This is because when a vacuum is applied, sharp bends will cause the hose to kink and prevent air flow.

STEP 7 Auxiliary Vent

AUXILIARY VENT: Take a short piece of the copper tubing(2) and cut a 1/4 inch hole(3) in it. Use this as an auxiliary vent that is to be spliced into the vacuum hose that leads to the float bowl vent. Make sure that the Auxiliary Vent hole is located inside the air filter(9) area. This auxiliary vent(3) allows the float bowl to vent properly, if necessary. .

STEP 8 Restrict Vent This step applies only to the carburetors listed below.

Motorcraft 2100 and 2150 carburetors, use the short section of fuel hose in the " Basic Kit" and insert it into the vent closest to the inlet needle valve. This is only done in those models that have vents 7/16 and larger. The Carburetor Enhancer tube(2) will be inserted in the vent farthest from the inlet needle valve (less chance of sucking fuel).

Rochester and Carter Quadra Jet carburetors have a vent located about 1/2 inch in front of the air cleaner retaining stud; "front" means toward the primary air horns. So the vent is back (and between) of the primaries and in front of the air cleaner stud. This is the proper vent to use on Quadra Jets for application of the Carburetor Enhancer. Do not use or modify any other vents. IF THE VENT IS SHAPED LIKE A SLOT, then use a short piece of rubber hose included in the " Basic" kit and cut it in half; wedge one half into each side of the slot. The Carburetor Enhancer tube(2) goes into the middle. Remember to insert the tube only about a 1/4th inch into the vent(1).

STEP 9 Brass control valve

CONTROL: Air flow volume control is important, it will allow fine tuning in your application. Adjustment of this valve(5) is called "BALANCING" the carburetor, because the air pressures in the float bowl are being balanced in relation to the air pressures elsewhere in the carburetor. The brass fittings mount on the brass valve(5).

INSERT VALVE: Cut the vacuum hose(4) with a knife and install the brass valve where it can be reached to adjust it when the air cleaner is installed. Wetting the brass fittings with saliva will make the vacuum hose easier to slide on.

Adjustment of the Carburetor Enhancer

WARM UP: Warm up the engine to operating temperature with the brass valve(5) turned off and the air cleaner(8) installed. Have a vacuum gauge and tachometer installed.

INITIAL ADJUSTMENT: Once the engine is warm and idling smoothly, start opening the brass valve(5). The RPM will increase slightly and the intake manifold vacuum will go up. As long as the RPM is rising, keep opening the valve(5). When the RPM stops rising, stop opening the valve(5), this should be the farthest the valve will ever be open. If using a Colortune, it is observed that the color of the flame stays the proper blue while the brass valve is being adjusted. A lean mixture is a white or very light blue flame, at engine idle a dark blue flame will be seen. Any tinge of green indicates too rich of a mixture. Yellow flames are very rich mixtures.

Note: The other vents in the carburetor can be blocked with the finger of the mechanic to see if a higher RPM is obtainable, while the initial adjustment is being made. If a higher RPM can be obtained with the vents partially blocked; then these vents can be permanently restricted with a piece of rubber fuel hose. In any case, the mechanic should always leave at least a 1/8 inch vent.

IN SHOP TESTS Installers of the Carburetor Enhancer can prevent most problems with a few simple tests. These tests are done in the "shop". Experience will teach how fast to move the throttle during these tests. If the experimenter intends to become an installer of the Carburetor Enhancer, contact Eagle Research for more installation details.

FLAT SPOT TEST: With the engine warm, idling, tuned up and the Carburetor Enhancer installed; slowly accelerate the engine beyond the engines normal operating range. For example- a V8 runs at 2400RPM. Slowly accelerate the engine to about 2600 RPM. Observe the tachometer for a "flat spot." A flat spot is where it is seen that the throttle is still being advanced, but the RPM is not picking up. In the unlikely event that a flat spot is found, simply close the brass valve(5) enough to move the flat spot up out of the vehicles normal operating RPM. Problems in the carburetor itself could also cause flat spots.

HESITATION TEST: With the engine warm, idling, tuned up and the Carburetor Enhancer installed; moderately accelerate the engine to 1500 RPM. If a hesitation is

noticed that wasn't there before, simply close the brass valve(5) till the hesitation is gone. This hesitation is caused by the small raise the intake manifold vacuum at the beginning of moderate acceleration. This effect is observed with a vacuum gauge. Hesitations can also be caused by problems in the carburetor. If watching a Colortune, the flame will darken when a hesitation occurs.

PULLOVER TEST: The most practical test to check if fuel is being suckled out of the float bowl is to put a "window" in the vacuum hose(4). In the "Basic" kit there is a small piece of clear plastic tubing. Temporarily splice this piece of clear plastic tubing onto one end of the restriction valve(5), so that the Carburetor Enhancer air flow can be seen while the engine is running.

Slowly speed up the engine to 3000 RPM and hold for fifteen seconds. If the clear tubing even gets "wet looking", fuel is being pulled out of the float bowl. The clear tubing must be removed after the test. Most of the time, fuel pullover is a clear indication of float bowl flooding. The fuel level rises to the point that the slight vacuum applied to the carburetor vent can suck up fuel. If pullover is seen, shut off the Carburetor Enhancer until the carburetor is fixed. Usually the cause of float bowl flooding is a dirty or malformed inlet needle valve. RPM: If, after adjustment of the Carburetor Enhancer, the RPM has picked up too much, simply reduce it with the idle adjustment on the carburetor.

DECELERATION TEST: It is highly unlikely that there will be any problem during deceleration if there is no other problems with the fuel system, but it is a good idea to test for a stalling condition during rapid deceleration. The Carburetor Enhancer normally holds back fuel during deceleration because of the high deceleration vacuum in the intake manifold. But in a rare case, it has been found that some engines don't recover fast enough and stall. This is easily fixed by simply (as noted above) closing the brass valve(5) a bit.

COOLER: Exhaust Temperatures can be tested, simply stick a thermometer at the end of the tailpipe to determine this.

POLLUTION : If a test for pollution is made, a considerable drop from the normal level of unburned hydrocarbons found in the exhaust will be observed[8].

REWARD: An intake manifold vacuum gauge is recommended.. Order from local auto supply store or JC Whitney & Co., 1917-19 Archer Ave., PO Box 8410, Chicago, IL, 60680, Phone (312)431-6102. It is the intake vacuum that makes the Carburetor Enhancer work and the higher it can be kept the greater the savings in gasoline and money.

REGULATOR: Most inlet needle valves seal better if the fuel pressure to them is reduced. A fuel pressure regulator is recommended. .The regulator is a variable 1-5 r pound adjustable regulator. Refer to the information given for Pressure Regulator(12) earlier in this article. .

INFORMATION: If help or installation advice is needed on the Carburetor Enhancer or the many other products of Eagle Research, write to: Eagle Research Inc.,107 Dewey Ave. PO Box 1852, Eureka, Montana, 59917. Or, Eagle Research,2KM MINE CAMP RD., PO Box 130, Galloway, BC, V0B 1P0, Canada. We do not have a phone in our shop, we found it interrupts our work. We prefer to correspond by mail or email; wiseman@.eagle-research.com Website:[Eagle Research](#) is a non-profit research organization.

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An Addendum giving Patent listings and other tech info is extra. This must be included unaltered with any copies of the Tesla article.

FOOTNOTES:

[1] The Scientific American Digest March,1926., pp.185. "Doubling The Automotive Mileage Per Gallon"

[2] US Patent 3,957,024 Mills 'Device For Vaporizing Liquid Fuel'

[3] US Patent 3,957,024 column1, line40

[4] US Patent 3,927,651 "Device For Vaporizing Fuel" column1,line35

[5] SAE Paper #760564. "The Vapipe,A Practical System For Producing Homogenous Air Mixtures" Society Of Automotive Engineers. [Link](#) tel#412-776-4970

[6] US Patent 4,083,340 'Gasoline Superheater'

[7] JC Whitney: [Catalog](#) tel#312-431-6111USA,312-431-5615other,8- 5CST.customer email: 72143.2561@compuserve.com Amex,Visa,Mastercard,Discover

[8] SAE Journal,July 1961 Paper No. 380-D "Leaner SI Engine Diet Boosts Efficiency" Prof.JM Bolt&David H. Holkeboer

Tesla, A Journal Of Modern Science. Available with membership in International Tesla Society,2220 East Bijou St.,POB 5636,Colorado Springs CO. 80931. Tel:719- 475-0918, 1-800-397-0137(USA), FAX:719-475-0582. US-\$30/yr., \$40/family, \$55/Corporate. Other: \$55. Mastercard, Visa, American Express cards accepted. Third Quarter, 1997 vol. V111, Number 3

TESLA: A Journal of Modern Science - 3rd Quarter 1997

Addendum

A list of all vapor patents in US class 123, subclass 545 is included. The Manual of Classification of the US Patent offices classes all types of devices in categories by using a number. Class 123 is internal combustion engines. A subclass of this class is defined as: "the various subordinate elements designed for and adapted to be used only with internal combustion engines and therefore included in this class are

indicated in the definitions hereinafter appearing of the various subclasses"[1]([#]=Footnote) Class 545 is a type of carburetor for an internal combustion engine that vaporizes the gasoline using a heat exchanger. In the words of the Manual: ".Class 545= Heating medium surrounds combustible mixture-subject matter under subclass 543 in which the heating medium completely surrounds a conduit or passage containing the combustible mixture." The reference 'under subclass 543' further clarifies the definition: ".the charge forming device or a part thereof for heating the combustible mixture formed by the charge forming means.[2] Most of these patents use the heat from exhaust gases to do this. There exists a system of International Classes that can be used to cross reference US patents to similar patents in other countries. There also exist special patents called 'International Patents' that use this classification system. The International Classification for these patents in US Patent Class 123[internal combustion engines] 545[heat exchanger /vaporizer carburetors] is: F02M 031/00 [Use this syntax when searching the IBM website, otherwise use: F02M 31/00 in USPTO website]

There are three other subclasses that also contain many vaporizer patents. The USPTO site can also be searched using the International Classification. This brings up many vapor patents that for technical reasons are 'hidden' in other subclasses. To conduct a search on the USPTO website, follow this procedure:

Go to USPTO web page by entering its address: www.uspto.gov Click 'Search Patents'.

Under the category 'US Patent Bibliographic Database', click "Advanced Search".

In " Advanced Search" Page, click 'All' under Select Database subheading.

There are four US classes in total that contain vapor patents, and the International Class which acts as a cross reference to 'hidden' patents. These are listed in the following table:

A)Patent Classes
B)NumberUSP in Class
C)Definitions
D(Enter under 'Query'

A)123/545
B)569(1997-1900AD)
C)Heating Medium surrounds combustible mixture
D)CCL/123/545

A)123/546
B)57(1997-1976AD)
C)Combustible Mixture surrounds heating medium
D)CCL/123/546

A)123/547
B)111(1997-1976AD)
C)Combustible mixture and heating medium adjoin one another
D)CCL/123/547

A)123/543
B)44(1997-1976AD)
C)Heating of Combustible Mixture
D)CCL/123/543

A)F02M 31/00
B)578(1997-1976AD)
C)International Patent Classification for gasoline vapor patents & related devices.
D)ICL/F02M-31/00

In the "Advanced Search" Page, enter under 'Query' the appropriate command line to search for patents under the Patent Classes. For example, enter ICL/F02M-31/00 after the flashing I-beam under 'Query' to access International Patent Classification database listed above under Definitions containing Patent Numbers of US Patents herein. Then Click 'Search' to bring these patents up onscreen on the USPTO webpage.

The United States Patent Office maintains links to websites of Patent Offices throughout the world. This can be accessed at address: [Other Patent Sites](#). On these other web pages, there are links as to yet other sites not given from the USPTO link. The user can also physically examine copies of the Official Gazette or actual US patents in the Patent Office of their respective country. By international treaty, the USPTO has a reciprocal agreement to exchange patent information with other countries. In Israel, for example, copies of the weekly Official Gazette (which contains a drawing and abstract of newly issued patents) are available from: ?Israeli Patent Office Library
Lev Hagiva, Building11,
Beit Hadebus Street, 11
POB34255
Jerusalem 91341
Israel

There exist patents of recent vintage that deal with using heat to vaporize gasoline and intake air for fuel injection systems in internal combustion engines. The Chandler patent of 1995 is one of them, he even goes as far as to cite the patents and early work of the Canadian inventor CN Pogue on gasoline vaporization in the late 1930's[3]!

An index of US Patents in class123, subclass 545- ' internal combustion engine carburetors that use heat to vaporize gasoline' is given from the years 1997 to 1900:

Classification: 123/545 Total: 569

5606956 ○ 5598826 X 5555855 X 5396866 X 5353772 ○ 5335639 ○ 5327875
5327874 ○ 5291870 ○ 5247909 X 5146897 X 5134986 X 5123398 X 5101801
5086748 X 5086747 X 5048501 X 5042447 X 5040518 X 5040517 ○ 5038742
5027759 X 5019120 X 5012788 ○ 4984555 ○ 4979483 X 4971018 X 4955351
4883616 X 4883040 X 4865004 X 4862859 ○ 4829969 X 4768493 X 4718393
4717808 X 4708100 X 4671245 ○ 4667643 ○ 4651702 X 4637365 ○ 4611567*
4603672 ○ 4593670 ○ 4592329 ○ 4583511 ○ 4574764 ○ 4548183 X 4534333
4524746 X 4513720 X 4513698 X 4503833 ○ 4491552 X 4478198 X 4469077
4467773 X 4465053 X 4463737 X 4452216 X 4438750 X 4434772 X 4425899
4420439 X 4416242 X 4407254 X 4404948 X 4401090 ○ 4399797 X 4399796
4399794 X 4388910 X 4379770 X 4377148 X 4372275 X 4366798 X 4357926
4351284 ○ 4338906 ○ 4327691 X 4318386 X 4302407 X 4300513 ○ 4286564
4256066 ○ 4212274 X 4192270 ○ 4167165* 4151820 X 4147144 ○ 4142481
4108953 X 4053013 X 4048969 X 4044741 ○ 4030457 X 4003357 ○ 3989014
3977366 X 3961616 ○ 3944634 X 3930476 ○ 3918423 X 3916859 X 3911881
3895617 ○ 3892211 X 3859971 X 3841284 ○ 3832985 ○ 3828736 X 3797468
3789817 ○ 3788292 ○ 3762385 ○ 3756022 X 3741180 ○ 3658042 X 3554174
3543736 X 3509860 ○ 3496919 X 3494342 X 3444848 X 3380442 ○ 3273550
3150652 X 3139874 X 3114357 X 3091229 X 3032023 ○ 3019781 ○ 2991778
2989956 ○ 2968297 ○ 2896658 X 2864355 ○ 2833262 X 2826183 ○ 2808041
2807245 X 2796855 X 2793633 ○ 2767699 ○ 2733698 ○ 2720197 X 2715520
2710605 ○ 2698613 ○ 2673446 ○ 2634983 X 2627257 X 2597977 ○ 2582916
2560197 X 2473808 ○ 2424723 X 2325850 X 2319752 ○ 2296790 ○ 2287593
2273957 X 2269930 ○ 2269706 ○ 2261493 ○ 2257047 X 2254775 ○ 2254634
2252415 ○ 2251999 ○ 2250786 ○ 2234901 X 2232413 ○ 2216801 X 2213154
2192067 X 2189022 X 2185573 X 2181058 ○ 2155162 ○ 2145029 ○ 2140254
2133775 ○ 2125216 ○ 2119885 ○ 2119179 X 2112568 X 2110806 ○ 2108639
2104013 X 2103902 X 2100466 ○ 2099278 X 2092246 ○ 2090823 X 2082666
2080662 ○ 2080420 X 2075330 ○ 2068952 ○ 2067292 ○ 2066922 X 2054997
2049596 X 2030508 ○ 2016881 ○ 2016695 ○ 2016694 X 2004093 ○ 2001669
2001466 ○ 2000669 X 1999237 X 1998497 X 1997497 X 1985271 ○ 1975093
1974722 X 1973889 ○ 1961249 ○ 1955242 X 1954586 X 1947048 ○ 1944396
1941487 X 1931781 X 1918380 ○ 1916952 ○ 1913684 ○ 1913497 ○ 1903433
1897540 ○ 1891768 ○ 1889648 X 1889619 X 1881671 ○ 1881562 ○ 1881434
1879551 ○ 1874327 ○ 1867457 ○ 1865515 X 1864608 X 1862723 X 1855129
1849135 ○ 1846008 ○ 1844298 ○ 1844041 ○ 1841740 ○ 1834202 ○ 1833552
1833183 ○ 1829400 X 1828899 ○ 1825225 ○ 1824926 ○ 1822147 ○ 1821047
1819284 ○ 1815432 ○ 1815178 X 1813406 X 1812950 ○ 1812939 X 1811540
1806581 X 1806045 X 1803461 X 1800426 ○ 1795037 ○ 1795036 X 1792828
1792367 ○ 1790812 ○ 1788929 ○ 1786233 X 1783781 ○ 1778190 ○ 1777554
1770689 ○ 1766794 ○ 1766781 ○ 1766709 ○ 1763948 ○ 1761960 ○ 1753788
1751511 ○ 1749035 ○ 1749029 ○ 1747361 X 1736003 ○ 1728421 ○ 1727605
1722846 ○ 1714210 X 1713701 ○ 1712465 ○ 1709968 X 1706492 ○ 1696881
1696761 X 1689942 ○ 1686609 X 1685564 ○ 1680373 ○ 1678045 X 1676955

1675870 ○ 1670550 ○ 1667886 ○ 1660609 ○ 1651393 ○ 1646779 ○ 1641619
1637768 ○ 1635266 ○ 1634968 X 1633909 ○ 1627671 X 1626783 ○ 1626727
1626561 ○ 1625135 ○ 1625134 ○ 1624249 ○ 1624229 X 1613029 ○ 1612377
1611299 X 1610541 ○ 1610000 ○ 1598289 X 1591071 X 1583584 ○ 1576301
1575859 X 1572747 X 1562670 X 1557657 X 1555807 X 1547474 X 1541431
1540144 ○ 1539963 ○ 1539126 ○ 1534290 ○ 1533855 ○ 1533432 ○ 1533196
1525956 X 1524680 ○ 1519516 X 1514189 X 1511820 X 1507315 ○ 1503900
1503821 ○ 1503805 X 1496102 X 1487234 ○ 1486058 ○ 1477724 ○ 1476316
1476281 X 1474359 ○ 1473999 X 1472899 ○ 1472326 X 1472264 X 1471600
1470659 ○ 1467759 X 1467225 X 1466647 ○ 1464759 ○ 1464466 ○ 1456572
1453007 X 1449333 X 1448781 ○ 1448641 ○ 1447975 ○ 1447089 X 1445194
1444852 ○ 1439146 ○ 1438877 X 1434353 ○ 1431327 ○ 1431326 ○ 1431281
1420684 X 1420616 X 1416977 X 1416352 X 1415086 ○ 1409093 X 1406598
1404215 X 1403350 X 1400955 X 1400485 ○ 1392168 X 1386376 X 1386297
1384281 X 1379437 X 1377990 ○ 1377369 ○ 1374927 X 1374280 ○ 1372194
1366831 X 1366018 X 1365564 X 1361503 X 1360098 X 1359168 ○ 1358686
1355076 X 1354484 ○ 1348066 ○ 1345927 X 1345378 X 1342950 ○ 1342869
1341141 X 1339870 X 1335990 X 1335665 ○ 1325998 ○ 1317709 X 1316346
1314872 X 1313639 X 1311417 ○ 1306496 ○ 1304987 X 1304205 X 1303559
1299648 X 1289605 X 1285652 X 1284643 X 1283125 X 1283068 X 1278558
1274707 X 1269252 X 1267924 X 1267139 ○ 1265735 X 1263259 X 1260388
1256738 ○ 1256186 X 1253682 ○ 1253681 ○ 1253642 X 1252796 X 1248417
1247983 X 1245519 ○ 1244151 ○ 1242975 X 1238404 X 1237536 ○ 1233744
1233287 X 1230116 X 1230092 X 1228415 ○ 1227649 ○ 1227551 X 1222860
1222548 X 1220281 X 1218867 ○ 1217781 X 1217448 X 1213817 X 1213736
1211775 X 1207664 X 1205540 X 1201977 ○ 1201871 X 1201731 X 1199573
1198013 ○ 1195764 X 1193004 X 1190252 X 1190129 ○ 1178972 ○ 1178276
1176816 X 1171435 ○ 1170337 X 1165656 X 1160438 X 1158494 X 1155599
1154617 X 1145995 X 1143902 X 1143092 X 1140064 X 1137057 ○ 1136675
1135113 ○ 1132420 X 1129794 X 1128133 X 1121868 X 1114200 X 1111140
1108916 X 1106881 ○ 1105592 X 1102478 X 1099842 ○ 1099271 X 1098915
1080139 X 1079338 X 1078919 ○ 1072875 X 1061626 X 1056760 X 1049417
1042004 X 1038300 X 1032937 ○ 1021326 X 1016741 X 1013759 X 1006088
0994658 ○ 0983307 ○ 0976237 X 0970429 X 0946780 X 0906671 X 0906111
0896183 X 0869675 X 0868834 ○ 0862377 ○ 0800777 X 0796684 X 0765814
0762271 X 0749864 X 0662169 X 0657738 ○ 0620586 ○ 0609831 ○ 0600107
0571495 X 0541773 X 0535914 X 0433806 X 0385121 X 0287578 X 0276075
RE22529 ○ RE18052 X 3640256*

Several vaporizer devices using heat to vaporize fuel have been commercially produced in the first half of the twentieth century. Considering the Otto-cycle or four stroke internal combustion engine is mechanically the same since its invention before the turn of this century, could we not conclude that these vaporizer systems are practical and work? Material discussed earlier in this paper-the vapipe-leads us

to this conclusion. We have not been able to find any such examples commercially produced and marketed after 1940.

There are two types of heat-exchanger vaporizers-those that burn heavy oils and those that vaporize gasoline. Heavy oils and kerosene will run an internal combustion or 'gas' engine, if the heavy ends in the fuel can be put into a vapor state-either by heat or mechanical action. Before the 'gas crises' of the 1970's, kerosene cost from 1/2 to 1/3 the price of an equivalent quantity of gasoline in the USA. This made such vaporizers economically practical, since a farmer or machinery operator would save a considerable amount in fuel costs.

The 1905 Scientific American has an advertisement on page 433 for 'The Meitz And Weiss Kerosene and Gas Engine'. It was ".belted or directly coupled to dynamo for electric lighting, charging storage batteries, pumping, and all power purposes.ADOPTED BY US GOVERNMENT .Highest award, direct coupled generator set Paris Exposition1900.Gold Metal, Pan American Exposition1901[4]." Gasoline engines were adopted in Great Britain for burning low grade kerosene and oils in generator and agricultural work as early as 1911[5]. Scientific American published further favorable comments on the development of 'distillate gasifiers' in 1913[6]. The Society Of Automotive Engineers was aware of vapor technology in 1913. N.B. Pope, Member of the Society says of this:

".It is evident that at least that a carburetor designed for heavy fuel may be more satisfactorily operated with gasoline than a gasoline carburetor with heavier fuel. To assist in the vaporization of the lower grade fuels, more heat is necessary than for gasoline."[7]

The process of using heat to vaporize fuel was accepted by mainstream engineers from the earliest period.[8]

A retired mechanical engineer told us that the US Government Bureau Of Standards certified and tested fuel vapor systems submitted for inspection up to the early 1930's. In view of the claim 'ADOPTED BY THE US GOVERNMENT' made in the early Scientific American advertisement, we wondered if such records of tests conducted might still exist in Government archives. A Freedom Of Information Act(FOIA) request to the National Bureau Of Standards gave the following reply: ".records of the tests you are requesting have been disposed of. In the 1958-1960 period, National Bureau Of Standards made a decision to destroy certain test records after holding them for 20 years. This decision was made after Congressional approval was given.[9]"

A practical vapor carburetor system for use on the internal combustion engine in the Fordson tractor enabling it to use ".the whole range of fuel oils, from benzol and gasoline down through kerosene to the very heavy fuels, such as black oil commonly used in Borneo[10]." The device was made by the Holly Carburetor Company, (which today makes carburetors for 'performance' cars or "hot rods") in the year 1925. The editors of Automotive Industries tested a Fordson tractor running the gasoline engine with waste crankcase lubricant! It was said of this:]

".runs under actual field conditions were made with the tank filled with waste crankcase lubricant. Even with this unusual fuel, little or no smoke showed at the exhaust end and the engine had the flexibility of gasoline operation.the element time lag has been reduced to a minimum, so that with the improved economy the demand for flexibility and ease of starting has been satisfied.[11]"

The Holley Vaporizer installed in the Fordson Tractor was so popular with farmers around the world that Bates and Strettell in the Proceedings Of the Institution Of Mechanical Engineers report on its widespread use in Great Britain in 1962![12] In the intervening period, we found two other references to a multifuel vaporizer that was marketed to the public in the literature. In 1936, the Italian company Fiat developed a vaporizing system for heavy fuels known as the "Naftoil". It was two carburetors in one, starting on gasoline and switching to heavy oils such as kerosene and gas oil when the motor was warm enough to run the vaporizer carburetor[13] The Italian engineer A.P. Castellini used fuel oil in a gasoline engine by using a high pressure pump which forced the fuel at a pressure of 3600 pounds through very fine jets into the intake passage. The oil is vaporized by mechanical means instead of heat. The engine was said to be readily started when cold, a problem with these systems.[14] This was in 1936, and we could find no more references to the production of such devices in the literature.

This system will work on the internal combustion engines of today. Refer to recently granted US Patent # 5,555,853. The possible practical result of further research into this is that so called 'waste oil' that is normally is discarded (recycled=given back to the oil companies) can be used to power a gas engine. This might be important if political crises like the oil price hikes of the early 1970's take place again. The Abstract of the Patent says:

"A lightweight back-pack generator set having a spark- ignited engine operating on middle-distillate fuels (e.g.:JP-5 and F-34) has been provided. The generator set includes a back-pack frame; an alternator, and a spark-ignited combustion engine,adapted to operate on middle-distillate fuel. The engine uses a preheater for heating the intake manifold to facilitate start-up operation of the engine."

A conversation with one of the inventors in Canada by telephone revealed some interesting points. He was familiar with the 1925 Holley Vaporizer and said that his unit would also run on (filtered and strained) crankcase oil or other wastes of this type. As described in the Abstract, this would make it practical for an infantry unit in a wartime environment, since the group could use almost any petroleum distillate as fuel. He also said it could be used in larger engines, such as an alternator/generator or stationery engines on a farm. Pollution levels were at or below United States Environmental Protection Agency requirements for conventional gasoline engines. It was easy to start in cold weather-overcoming a major disadvantage of older units.

Vaporizer carburetors for gasoline using exhaust heat have been commercially produced in the past in the United States and elsewhere. In 1923, the Stewart-

Warner Corporation sold an exhaust gas operated heat exchanger carburetor vaporizer system commercially in the United States. The system was favorably reported on in the technical literature of the time.[15] It was said:

"Further claims for the direct fuel system are that it eliminates the formation of carbon, as the fully vaporized fuel will burn more nearly completely; that it permits the use of lower jacket water temperatures; that it reduces the tendency to detonate; that it provides better fuel distribution-ensuring smoother performance and that it reduces crankcase dilution and its related troubles- wear and corrosion[16]"

In 1924, a vaporizer was produced and sold by a group of Chicago engineers. It used exhaust gas to vaporize the gasoline, and claimed to be self adjusting inasmuch as it enriched the fuel for high speed and heavy pull and leaned it otherwise. ".A decrease in the CO(ie: carbon monoxide) content of the exhaust combined with a greater fuel efficiency was noted in the article[17].

A gasoline vaporizer was developed in 1925 in Canton,Ohio . It was said of this device:

".that none of the raw gasoline delivered by the carburetor during starting can get into the engine cylinders. The fuel is vaporized not by contact with the relatively small and excessively hot area, which often results in cracking, but by a differential action which removes the lightest constituents first and brings the remainder in contact with surfaces of increased temperature until they are vaporized also[18].

This principle is the same as that given in the writings of inventor R. Covey in his patent 4,611,567 and in literature privately printed and circulated by him[19]. Covey referred to the Voight patent 2,733,698 column 3, lines 40-45. He also referred to the Spindler patent 2,185,573 page1,column2,lines 20-30 on 'dry' gas. He said that an understanding of these patents is essential to successfully designing an efficient vapor system.

Charles Nelson Pogue of Winnipeg, Canada produced a highly efficient vaporizer carburetor using exhaust gas as a source of heat for tractor and vehicle usage in the late 1930's. CN Pogue was issued US patents 1,750,354 1,997,497 and 2,026,798. The final design based on his last patent would cut the gasoline consumption of a tractor under conditions of maximum load down to between one half and one third of what it was equipped with a 'stock' carburetor. It obtained 130 miles per Imperial gallon on a subcompact car with an 80 cubic inch engine cruising at 65mph under ideal climatic conditions-early September-in Winnipeg and surrounding areas. This claim was made by the head of an auto firm in Winnipeg, Canada who has physical possession of part of a Pogue carburetor system[20]. In this article, the reader must be mindful that an Imperial gallon used in Canada in the 1930's equals five US quarts of gasoline. This becomes one hundred miles per US four quart gallon using a little arithmetic. The carburetor was sold to farmers until the beginning of WWII, and then its production and distribution stopped for undetermined reasons[21]. It has been

said that the Pogue carburetor was used under conditions of strict military secrecy in the North African desert inside of the Bren Gun Carrier against General Irwin Rommel's Afrika Korps and may have been a reason for his defeat. It was also said to have doubled the effective range of these vehicles under conditions of desert warfare-making them superior to Rommel's technically better equipment[22]. Former US President Ronald Reagan issued an Executive Order declassifying all activities and information recorded or experienced before the end of World War II in 1945;so these adventures are no longer under a security classification. If any readers know more and had actually been involved in these military operations, please contact us.

Since CN Pogue in the late 1930's, no heat exchanger type vapor system has been commercially produced in the United States or Canada. The large energy and automobile companies have constructed working prototypes and done research on heat exchanger vaporizer carburetors since the oil crises of the 1970's, although these have not been brought to public attention in the mass media.

Douglas R. Hamburg of Ford Motor Company was awarded a patent for an 'Electric Fuel Vaporizer' in 1977[23].He published SAE paper760288 on his work with this patent[24]. He claims -as a significant innovation- an electric vaporizer in series with the exhaust operated system for an easy start from vapor. A gasoline vaporizer system described in the August,1923 SAE Journal makes a similar claim: "special efforts have been made in the design of the carburetor to facilitate starting in cold weather; to this end, for starting, the gasoline is vaporized and superheated electrically[25]." The inventor Ray Covey solved the problem by leaving the conventional carburetor attached to the engine and placing the vaporizer in series with it connected by a heat insulated tube. The engine could be started from the regular carburetor and then switched over to vapor mode once the heat exchanger had reached the proper temperature by use of a two way electric solenoid switch in series with the carburetor fuel line. This had the added advantage of being able to switch back to the 'stock' carburetor if there was a malfunction in the vapor system. Less complexity means fewer mechanical problems"-keep it seriously simple" as inventor George Wiseman says. Engineer Hamburg says:

"The basic vaporized gasoline metering system utilizes engine exhaust heat to fully vaporize liquid gasoline entering an exhaust gas heat exchanger"[26]

Such technology has been well known to those skilled in the Art for over half a century. The SAE Journal for August,1923 has an extensive discussion of this concept by one of its members in the article "Exhaust Heated Vaporizer"[27]. One of the favorable results from this was :

"The use of extended lean limit operation is an intriguing approach to the control of exhaust emissions, and is based on the relation of such emissions to air fuel ratio shown qualitatively in Figure 13 [28].

Figure 13 of SAE paper 760288 shows an inverse relationship between the percentage of NO_x, HC and Carbon Monoxide emissions from the exhaust and an increase in the Air-Fuel Ratio between 12:1 and 22:1.

The heat exchanger 26 in Figure One of Hamburgs' 'Electric Fuel Vaporizer' patent was granted a separate patent #4,161,931 in 1979[29]. Hamburg and Giardini conclude:

Experimental results have indicated that to the extent to which the air-fuel ratio may be controlled more accurately, the ability to implement techniques for the reduction of atmospheric pollutants generated by a combustion engine may also be increased[30].

If the more complete combustion of gasoline made possible by heat exchanger technology makes workable lower polluting emissions because these elements in gasoline are now vaporized and used to power the engine, why hasn't the public learned of this new technology[31]? Would its use make a catalytic converter last the life of the engine? There are many other patents issued to energy and automotive companies[32].

A minor but very important point-the intake manifold must also be heated to prevent the gasoline vapor from condensing. See General Motors Patent 3,892,214. Also see 'Manifold Vaporization And Exhaust Gas Temperatures' in the SAE Journal[33].

Both the United States and British governments hold gasoline vapor patents. US Patent 3,640,256 'System For Preconditioning A Combustible Vapor' was invented by George M. Low in 1970 and is held by the National Aeronautics And Space Administration. Using a FOIA petition, we found that the project was shelved by a memorandum written by a John Brogan of the EPA office in Ann Arbor, Michigan citing SAE paper 670485. It is interesting to note in spite of results indicating a drop in pollutants consistent with all the literature cited previously, paper 670485 comes to an ambivalent conclusion. Could it be poor design of the apparatus- the vapor storage tank is the size of a home hot water heater(9 cubic feet in size) when the one in Covey's successful system was only a fraction of its size? Why did not the bureaucrat Brogan cite other SAE papers giving successful results that coincided with the lab tests on the NASA device? The British Government holds United States Patent 4,167,165 [34]. A look at the illustrations of the device-this patent bears an uncanny physical resemblance to the Bursley-Trask Fuel Adjuster in the 1926 Scientific American article cited in our essay for the scientific journal Tesla If this older system can double the mileage of an automotive engine, then what can Ian C. Findlay's British patent do? We have found another vaporizer patent granted to Ian C. Findlay assigned to the Shell Oil Corporation[35]! Mr. Findlay is a British subject, and so are the other two inventors Rodger Lindsay and John Wilson of the patent assigned to the Shell Oil Corporation. Findlay holds the British Government patent with a George

Gallacher, who is also a British subject. Why has the public never heard of these patents?

In conclusion we have found information that might also be of interest to farmers. In the USA, a farmer can obtain a permit to convert waste vegetable material to alcohol for fuel. The Mobil Oil Corp. published a paper describing work on the conversion of ethyl alcohol to gasoline[36]. The Environmental Protection Agency at the China Lake Naval Weapons Research Center developed a system that converts cellulosic (ie: green plant) type solid wastes or biomass (ie: plant material) to gasoline[37]. Could the farmer use this to co-operatively make his/her own gasoline for farm equipment from wastes normally discarded? Has further work been done on this?

Please post any material giving an improvement in the vapor system back to George Wiseman's website so that this can be republished and shared with others. The Ray Covey Patent 4611567* referred to in the beginning of the Tesla article is in this class and has been highlighted and underlined, and marked with an asterisk to bring it to the reader's attention. So have US(3,640,256*) & British Government(4,157,165*) held patents.

Footnotes:

[1] US Patent Office Internet version of Manual Of Classification:

[2] Ibid.

[3] US Patent 5,394,838 'Vaporized Fuel Injection System'. Also see: US Patent 5,056,495 (Texas Instruments)

[4] Scientific American Volume XCII, Number 21 May 27, 1905 pp.433

[5] Engineering (Great Britain), February 17, 1911. 'The Davis Paraffin Carburettor', page 216

[6] Scientific American August 2, 1913 Article: 'Distillate Gasifiers For Motor Vehicles' page 95.

[7] SAE Transactions, 1913 Part I, Volume VIII, pages 118-119. Article: "Low Grade Motor Fuel For Trucks"

[8] SAE Transactions, 1911 'Carburetor Division Report', 1911 page 648. [Here the SAE sets construction standards for vaporizer carburetors!] Article: 'Kerosene Carburetors', AC Bennett. [discussion and extensive bibliography. An early system, the 'Wilcox Bennet Vaporizer' illustrated. Source: University of Rochester Libraries. Dewey Decimal Classification: TL2 S678t v.6 Also, see Scientific American June 3, 1916 page 584 Article: 'Plain Facts About Kerosene Carburetors', Victor W Page M.S.A.E.

[9] Karl E. Bell, Deputy Director Of Administration, F.O.I.A. Officer, FOIA request, 9/15/83

[10] Automotive Industries., April 16, 1925. page 698-699. Article: 'New Holly Vaporizer Permits Use of Any Grade Of Fuel'

[11] Automotive Industries Ibid., page 698

[12] Proc. Instn. Mech. Engrs. (A.D.) (Great Britain) No. 4, 1961-62 pages 146-157. [cite: pp 147] 'The Influence Of Tractor Service Conditions On The Quality Of Fuels, Lubricants, and Protective Materials', E.S. Bates & R.P. Strettell

- [13] Automotive Industries. January 17,1924, pp.141. "Vaporizing System For Heavy Fuels Designed By Fiat"
- [14] Motor., January 1936, page 62 Article: 'High -Pressure carburetor Uses Fuel Oil'
- [15] Automotive Industries, June 30,1923 pp. 1004-1006 'Atomization Takes Place In Tank In New Fuel System', A.F. Denham.
- [16] Automotive Industries., June 30,1923 pp.1006
- [17] Automotive Industries, December 18,1924. pp. 1049-1050 'New Device Enriches Charge For High Speed and Heavy Pull And Leans It Otherwise'. By W.L. Carver.
- [18] Automotive Industries., September 24, 1925 pp.516 'Designs New Fuel Vaporizer'
- [19] R.Covey, personal communication
- [20] Winnipeg Free Press., August 18, 1973 page 6 Article: 'Auto Firm Head Recalls That "Legendary" Carburetor By Greg Shilliday.
- [21] Winnipeg Free Press.,April 30,1942 page8. 'Hints Pogue Carburetor Sabotaged'
- [22] personal communication-war veteran
- [23] US Patent 4,047,512 Electric Fuel Vaporizer Douglas R. Hamburg and Jerome F. Hough Assignee: Ford Motor Company International Claims: F02M 031/00 US Classification: 123/122
- [24] SAE Paper #760288 A Vaporized Gasoline Metering System For Internal Combustion Engines D.R. Hamburg and J.E. Hyland Engineering and Research Staff, Ford Motor Company.
- [25] Journal Of The Society Of Automotive Engineers., August,1923. Vol.XIII.,Number 2. Page 131.
- [26] SAE Paper#760288., pp.3
- [27] The Journal Of The Society Of Automotive Engineers August,1923. pages 130-132. Article: 'Exhaust Heated Vaporizer'
- [28] SAE Paper #760288 page7.
- [29] US Patent 4,161,931 Douglas R. Hamburg, Dante S. Giardini, 'Vapor Temperature Controlled Gas Heat Exchanger' Assignee: Ford Motor Corporation
- [30] US Patent 4,161,931, column2,line20
- [31] SAE Paper 720462 'Ethics Of The Professional Automotive Engineer'.
- [32] Examples given are US Patents, assignee in parenthesis: 4,085,721(Exxon), 3,996,906(GM), 3,763,839(Phillips Petroleum), 3,957,024(Shell Oil), 3,927,651(Shell Oil) , 4,087,512(Ford), 4,022,172(American Motors), 3,851,633(General Motors)
- [33] SAE Journal., March,1922, Volume X, Number 3.,pages 171-176 "Manifold Vaporization And Exhaust Gas Temperatures", O.C.Berry and C.S. Kegerreis(Purdue University)
- [34] US Patent 4,167,165 Fuel Vaporizer For Internal Combustion Engines. Ian C. Findlay and George C. Gallagher, both of Glasgow, Scotland., assignors to The Secretary Of State For Industry In Her Britannic Majesty's Government Of The United Kingdom Of Great Britain And Northern Ireland.
- [35] US Patent 3,763,838. Ian C. Findlay, Rodger Lindsay, John Wilson 'Carburetor Having A Heat Pipe For Vaporizing Fuel' Assignee: Shell Oil Company, New York, New York. Oct 9,1973
- [36] The Engineering Index Annual, 1982. Citation 043671,page 3210. 'Catalytic Conversion Of Alcohols To Gasoline By the Mobil Process' It is said: ".related work on

conversion of ethanol (ie: ethyl alcohol/"booze") to gasoline is also discussed briefly. Lee, W (Mobil Research and Development Corp., Paulsboro NJ, USA Maziuk, J; Weekman, V.W.Jr., Yurchak, S. 'Symposium Paper Energy From Biomass and Wastes4,' Lake Buena Vista, Fla. USA Jan. 21-25, 1980 Published by Institute Of Gas Technology Chicago, Ill., USA, 1980 pp. 721-25

[37]'Engineering Index Annual, 1982 Citation 04372, page 3210 Thermochemical Conversion Of Wastes/Biomass To Gasoline'. Abstract: '.The process involves three operations: a selective pyrolysis step to convert the feedstock to gases rich in olefins such as ethylene, propylene, and butylene, a compression and purification step to concentrate this gasolene, and a thermal polymerization step to convert the olefins primarily to high octane gasoline..this work discusses the information necessary to determine product yield as well as work done by Dow chemical.'" reference: Liberick Walter W, Jr. (US EPA, Cincinnati Ohio, USA) Symposium Paper: Energy From Biomass And Waste#4, Buena Vista Fla USA January 21-25. 1980. Published by the Institute of Gas Technology Chicago, Illinois, USA pages 747-763.

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Fuel vaporizer Links

[Pogue Carburetor, 'Gasoline Vapor Maker' Increase Mileage](#)

Technical Discussion

<http://www.energeticforum.com/renewable-energy/3288-efficient-carburetor-designs.html>

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