ISSN 2395-1621

Review on Performance and Emission Characteristics of SI Engine by using Magnetic Flux for alternative fuels

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ABSTRACT

The invention resides in the field of treatment of hydrocarbon fuels in liquid or gaseous form, to increase the fuel burning efficiency, by subjecting the said fuel flowing in containment vessels or conduits, to a shaped uniform magnetic field having a consistent directional flux. Hydrocarbon fuels have long branched geometric chains of carbon atoms which have a tendency to fold over onto themselves and on adjoining molecules due to intermolecular electromagnetic attraction existing between like molecules or atoms. Magnetic effect helps to reduce fuel consumption, when fuel flows through powerful magnetic field created by Magnet, inter molecular forces is considerably reduced or depressed hence oil particles are finely divided. This has the effect of ensuring that fuel actively interlocks with oxygen producing a more complete burn in the combustion chamber. The magnetic ionization of the fuel also helps to dissolve the carbon build-up in carburetor jets, fuel injectors and combustion chambers and thus keeping the engine and environment in a cleaner condition. Hence by establishing correct fuel burning parameters through proper magnetic means that an internal combustion engine is getting maximum energy per liter as well as environment with lowest possible level toxic.

ARTICLE INFO

Article History

Received: 1st December 2016

Received in revised form :

1st December 2016

Accepted: 5th December 2016

Published online :

5th December 2016

Keywords: Magnetic effect, Combustion, Emissions, paramagnetic ,diamagnetic

I. INTRODUCTION

Most of fuels for internal combustion engines are liquid, fuels do not combust until they are vaporized [9] and mixed with air. Emission from most of the motor vehicle consists of unburned hydrocarbons, carbon monoxide and oxides of nitrogen. Unburned hydrocarbon and oxides of nitrogen react in the atmosphere and create smog. Smog is prime cause of eye and throat irritation, noxious smell and decreased visibility. Generally fuels for internal combustion engine are compound of molecules. However these molecules have not been realigned, the fuel is not actively inter locked[13] with oxygen during combustion, the fuel molecule or hydrocarbon chains must be ionized and realigned. The ionization and realignment is achieved through the application of magnetic field. An objective of the Magnetic field effect on fuel is to provide significantly improved molecular excitement [13] and turbulence in fuel so that re-polymerization is more effectively resisted and improved fuel efficiency is achieved.
Application of the magnetic field is important in many aspects of research and practical applications[9]. Over the past century, need and development of micro-power devices have necessitated the need for studies to look further that can enhance combustion processes of fuels by optimizing system parameters. This is essential so as to utilize the high specific energy content of liquid hydrocarbon fuels.

Magnetic fields can affect fluids that can exhibit paramagnetic and diamagnetic[9] behavior (even if the fluid is not electrically conducting) And, this suggests the potential ability of magnetic control of air flows and also combustion. Paramagnetism is a result of unpaired electrons within an atom that can cause a magnetic dipole to form in the presence of a magnetic field and, as a result, in the presence of a magnetic field this effect causes the fluid to be drawn in the direction of increasing magnetic field strength[7]. On the contrary, if the electrons are already paired, the atoms resist the formation of a dipole and this resistance causes the atoms to move in the direction of decreasing magnetic field strength,

known as diamagnetism. Paramagnetic behavior[13] is about three orders of magnitude larger than the diamagnetic behavior. Oxygen and air are examples of paramagnetic substance and are drawn towards higher magnetic field strengths. Nitrogen, carbon dioxide and most hydrocarbon fuels are examples of diamagnetic[13] substances and are repelled by stronger magnetic fields. Thus, the behavior of these gases in the magnetic field suggests a new scientific method of analysis and separation in gases, using the magnetic field.

The dynamics of combustion of hydrocarbon fuel has forever been a subject of intense research the world over as also the problems associated with it such as decrease in equipment efficiency through incomplete combustion[14], consequent carbon deposits and high emission levels. Efforts have always been on to achieve the best possible burning and energy output from fuel combustion systems, the aim being , to increase fuel efficiency and to reduce exhaust emission levels. [1]

The performance improvement and emission reduction of SI engines are many methods available to incorporate the concept in spark ignition engines.[1] They can be broadly classified based on the principles as: (a) Engine design and operating variables (b) Engine system design (c) Fuel system design (d) Exhaust treatment devices (e) Evaporative emission devices. All these methods except magnetic fuel conditioner which comes under the fuel system design, involve major modifications or additional gadgets involving high cost. A high gauss magnet is placed on fuel line before carburetor or fuel injector to activate the fuel to make better combustion. This gives improving in the performance of SI engine and reduction in emission.

Fuels other than gasoline and diesel such as LPG, Hydrogen and Biodiesel are alternative fuels. By using alternative fuels IC Engine gives better performance for same capacity than gasoline.

II. LITERATURE REVIEW

1. The invention resides in the field of treatment of hydrocarbon fuels in liquid or gaseous form to increase the fuel burning efficiency by subjecting said fuel flowing in containment vessels or conduits to a shaped uniform magnetic field having a consistent directional flux.[1]

2. The concept of exposing hydrocarbon molecules to magnetic fields dates to J. D. van der Waals and his experiments in the field. Hydrocarbon fuels have long branched geometric chains of carbon atoms which have a tendency to fold over onto themselves and on adjoining molecules due to intermolecular electromagnetic attraction existing between like molecules or atoms, which is known as van der Waals forces. In his experiments, vander Waals applied focused magnetic fields to hydrocarbon chains (oil) and found that the viscosity of the fluid decreased with the application of the field which, in turn, caused an increase in the flow rate in the fluid. The effect of electric fields on combustion is well established .Later it is found that the interaction between fuel ions and the magnetic fields were much, too small to cause the disturbance in fuel structure. The changes in the behavior were attributed to a pressure gradient caused by the difference in magnetic perm abilities.[9]

3. The experiment is note worthy in that hydrocarbon fuels do not exhibit a dipole moment. It is to be understood that the hydrocarbon based fuel should not have responded as it did to the presence of the magnetic field. However, Faraday's investigations showed that all substances are magnetic, although in most cases the magnetic effect is very small. In the case of hydrocarbon based fuel, which was formerly thought to be a polar substance without a magnetic moment, the van der Waals experiment proved that electrons in all substances can be affected by an external magnetic field. Increased combustion yields increased fuel efficiency with lower hydrocarbon emissions from hydrocarbon based fuel burning apparatus. The focus the magnetic field in opposition or directional alignment, determine magnetic field strength, select appropriate magnetic materials and determine mounting arrangements for the greatest efficiency. Earlier attempts have proven to be less than satisfactory, producing only limited results as can be seen from the discussion of the teachings of the several patents.[13]

[4] An object of the present invention to increase the fuel burning efficiency of a hydrocarbon fuel passed through a conduit or containment vessel about which the apparatus is mounted in diametrically opposed positions to create a uniform magnetic flux density to affect the molecules of the fluid fuel in such a manner as to increase the fuel burning efficiency. [14]

III. CONCLUSION

By establishing correct fuel burning parameters through proper magnetic means one can assume that an internal combustion engine is getting maximum energy per liter as well as environment with lowest possible level toxic emission. Magnetic effect on fuel increases the internal energy to cause specific changes at a molecular level which obtained easier combustion. The resultant is fuel burn more completely, which producing higher engine output, better fuel economy, more power & most importantly reduces the amount of HC, CO, NOx in the exhaust.& therefore control the emission at low cost. An improved fuel feed nozzle may

be used to enhance combustion of the fuel. The air is treated to enhance combustion by placing a magnetic field component within the air stream. Finally the exhaust is treated by placing a configuration having and a magnetic field component within the emission gas return (EGR) conduit.

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