Journal of Chemical and Pharmaceutical Sciences ISSN: 0974-2115

Self-Fueling Vehicle by using the Magneto Ignition System

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ABSTRACT

Nowadays most of the citizens in India are using the motor vehicles. This paper deals about the auto riding of the vehicle by using the magneto ignition systems. By this technique the vehicle can generate its own fuel from its movable energy. The main theme of this paper is to reduce the petrol consumption of the vehicle. The ignition system of a vehicle can generate its own fuel from its movable energy. In this technique inductor magneto is used such that the magnet is rotated and the coil is stationary. The ignition system is coupled to the center core of the wheel of a vehicle. Such that the power which generates from the ignition system is increased and it is used to operate the electrical motor which has been coupled to the power wheel of the vehicle where the output of the engine is released.

Keywords: Magneto ignition system, Coil, Electric motor.

INTRODUCTION

According to automobile association, a motor organization, in a January 2014 a liter of diesel cost 132.8 p, a record in nominal terms, a liter of petrol 128.3p increased, just shy of all-time peak. True, oil prices are high: the cost of brunt crude oil is again nudging $100 a barrel. But government policy plays a big part, too, in the form of a rise in the rate of VAT from 17.5% to 20% in January and a separate increase in the duties leveled on petrol and diesel.

From this paper we are introducing the concept of decreasing the fuel consumption of a vehicle by using the magneto ignition system. This system is more useful for the motor vehicles and especially for bikes. Nowadays the fuel (Petrol) cost is too high. And this is not good and the riders don't like this. In order to eradicate this type of problems this is the better solution. By this concept we are saying that this may be much useful for our society. In this paper we are going to discuss about the concept implementation and the operation.

REQUIREMENTS

Magneto Ignition System: In the automobiles like motor bikes the ignition system for the internal combustion engines are used. There are two types of ignition systems one is battery ignition system and another one is magneto ignition system. In the magneto ignition system it contains two types such as stationary ignition system and shuttle magneto (the engine rotates a coil of wire in between the magnetic poles) and the inductor magneto (the magnet is rotated and the coil remains stationary).

Battery: Valve Regulated Lead acid Battery. It is the designation for low maintenance lead-acid rechargeable battery. Because of their construction, VRLA batteries do not require regular addition of water to the cells. Two types such as Absorbent glass mat battery, Gel battery. These batteries are often colloquially called sealed lead acid batteries, but they always include a safety pressure relief valve. The name "valve regulated" does not wholly describe the technology. These are recombinant batteries which means that the oxygen evolved at the positive plates will largely recombine with the hydrogen ready to evolve on the negative plates. Thus it prevents the water loss. So only this type of battery is selected for this concept. As it can have the capacity of 48v and 20Ah. The charging voltage ranges from 48v and the rate of current is 2.5A.

Electric Motor: The motor used for this concept is a brush-type, permanent magnet DC motor with very high efficiency. It is Capable of 4.8 KW continuous and 15 KW for 30 seconds. The voltage range is from 12 to 48 VDC input and 100 amps continuous (300amps for 30 seconds). It makes a great replacement for the original Etek motor because it has same bolt pattern and is actually lighter in weight.

Journal of Chemical and Pharmaceutical Sciences ISSN: 0974-2115

Table.1.Parameter Specifications

Contents	Preferences
Number of cylinders	1
Engine capacity	100 cc
Power	7bhp @ 6000 rpm
Torque	8.3nm@6000 rpm
Cooling system	Air cooled engine

The bore and stroke is found as following:Bhp = (d2) * n; Where, d = diameter of cylinder (inches); n = no. of cylinder; 7= (d2) * 1;d = 67mm

Design: Let us consider a center wheel hub motor. In that wheel only the motor can be replaced and the magnetic cup can be sealed in it. Thus the sleeve inside the center core part of the wheel contains the brake lining. Thus the lining of the lining can be removed by the proper lathe machine. And then the magnetic cup of the magneto ignition system is to be fitted to the center core part. Thus the fitting can be made good by welding. Moreover the welding has a good compatibility with the aluminium and the iron. Such that the wheel core is aluminium and the magnetic cup is iron. The remaining unwanted welded material can be removed by using the machines.

Thus the remaining part of the magneto ignition system such as the coil, condenser, and breaking points is coupled towards the center shaft of the wheel. Such that the shaft is fitted constant without any rotation. Thus the magnetic cup rotates along the wheel of the vehicle while moving and the centre part of the wheel contains the coil which kept constant. Thus it is the concept of shuttle magneto ignition system such that the magnet rotates and the coil is kept constant. While the wheel rotates in a speed means the magnet also rotates according to the speed of the vehicle. The coil inside the wheel remains stationary. Thus the current is produced inside the coil and it is getting outwards through the wires. This is the design applied only at the wheel of the vehicle.

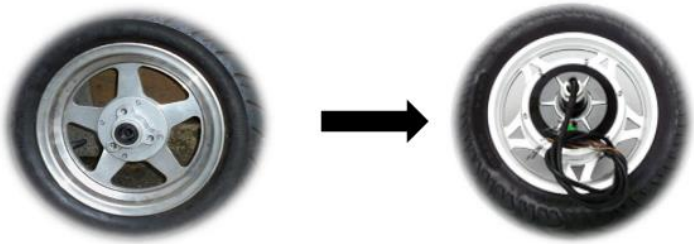

Fig.1.Design of the wheel

The concept of this design is that the vehicle has four transmissions. Such that in the first and second transmission the vehicle has to work by the fuel and the upcoming transmissions it should be work on the following setup. This type of setup is done at the gear box area of the vehicle. Such that the gear for the first and the second transmission can be connected towards the crank shaft of the engine. And for the upcoming transmissions the gear is connected towards the electric motor. And the setup is connected in such a way that when the clutch is applied the total power of the engine and also the electric motor is disengaged from the wheel of the vehicle. A secondary clutch is made in such a way that it operates only for the third and the fourth transmissions. It is designed in a way such the secondary clutch is automatically operated for only the last two transmissions. And the remaining setup can be explained while explaining about the operation.

Operation: Assume a man going in a vehicle in a straight road. While he is travelling at a speed of 70km/hr, he uses the third or the fourth transmissions. In that speed most of the fuel is used. In order to reduce the consumption of the fuel this system will helps you. Let discuss about the operation of the magneto ignition system as a fuel for the fast moving vehicle. And this setup is only applicable for the fast moving vehicle. It's just like a recyclable energy.

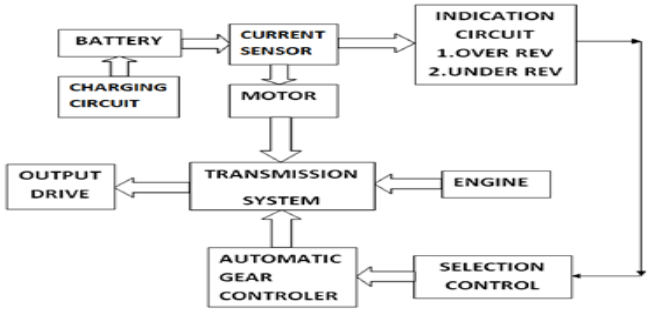

Fig.2.Block Diagram

While the vehicle moves the current is generated and it is stored in a battery. And the stored energy is used as the fuel for the vehicle. When the vehicle moves in the first and the second transmissions the speed of the vehicle ranges between 10 to 50 km/hr. According to the setup the vehicle moves by its fuel. When the rider or user changes the transmission to third and the fourth transmissions, the fuel to the engine is cut off by the carburetor. And the crank shaft connection to the gear box to be disengaged. Automatically the secondary clutch engages the electric motor towards the gear box of the vehicle.

Power generation: The vehicle moves in a speed is 10 to 50 km the magnet coupled with the wheel rotates along the wheel. On each revolution, cam open contact breaker one or more times, interrupting the current, which causes the electromagnetic field in the primary coil to collapse. As the field collapses there is a voltage induced (as described by Faraday's law) across the primary coil. As the points open, point spacing is such that the voltage across the primary coil would arc across the points. A capacitor is placed across the points which absorb the energy stored in the primary coil. The capacitor and the coil together form a resonant circuit which allows the energy to oscillate from the capacitor to the coil and back again. Due to the inevitable losses in the system, this oscillation decays fairly rapidly. A second coil, with many more turns than the primary, is wound on the same iron core to form an electrical transformer. The ratio of turns in the secondary winding to the number of turns in the primary winding is called the *turn's ratio*. Voltage across the primary coil results in a proportional voltage being induced across the secondary winding of the coil. The turns ratio between the primary and secondary coil is selected so that the voltage across the secondary reaches a very high value, enough to arc across the gap of the spark plug.

In a modern installation, the magneto only has a single low tension winding which is connected to an external ignition coil which not only has a low tension winding, but also a secondary winding of many thousands of turns to deliver the high voltage required for the spark plug(s). Such a system is known as an "energy transfer" ignition system. Initially this was done because it was easier to provide good insulation for the secondary winding of an external coil than it was in a coil buried in the construction of the magneto (early magnetos had the coil assembly externally to the rotating parts to make them easier to insulate—at the expense of efficiency). In more modern times, insulation materials have improved to the point where constructing self-contained magnetos is relatively easy, but energy transfer systems are still used where the ultimate in reliability is required such as in aviation engines.

Figure.3.Magneto ignition system

Working: The power generated by the magneto ignition system has 12v and 32 amps. It is then stepped up into 230v. This 230v is given to the input of the battery charger. The charger is a device which is used to convert the high AC

voltage into low DC voltage. The low voltage comes from the output of the charger is then transferred to the battery terminal then the battery can be charged. This process is continued and achieved until the rider the vehicle in the first and the second transmissions. When the rider increases the transmission of the vehicle, the speed increases and the crank becomes disengaged from the gear. On that same score the electric motor fixed with the third and the fourth transmissions get contact with the gear box. The battery supplies the current to the electric motor. Thus the motor starts to rotate in the forward direction. Thus the vehicle moves in the forward direction. For an example if a vehicle moves at a speed of 60 km/hr then the power produced by the ignition dynamo is saved in the battery and the function starts and the vehicle moves in the constant speed. The motor initially produces only a low torque. So the secondary clutch is gently applied. Now the torque of the motor is gradually increases. As the gear box increases the torque of the motor thus the vehicle moves in the constant speed.

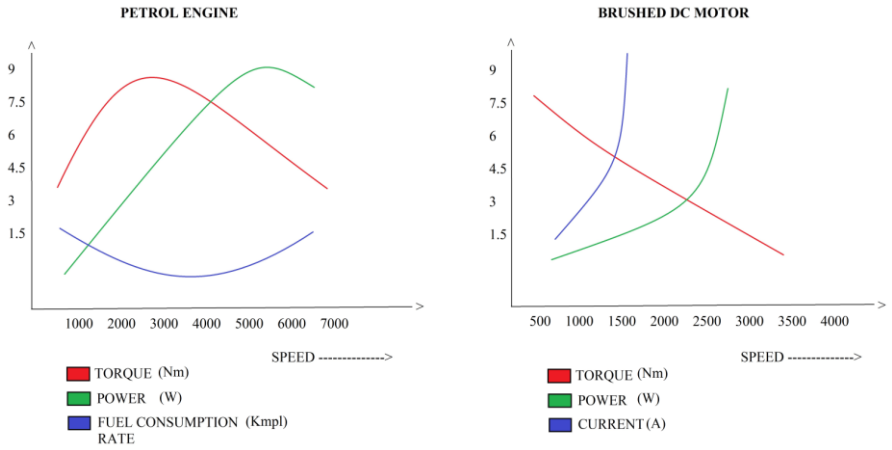

Fig.4.Performance Curves

Motor power calculation: The power required by a motor can be expressed as follows:

$\mathbf{P}_{traction} = \mathbf{P}_{grade} + \mathbf{P}_{accel} + \mathbf{P}_{tyres} + \mathbf{P}_{aero}$---------- (1)

Where,

$\mathbf{P}_{grade}$ is the power (W) required for the gradient,

$\mathbf{P}_{accel}$ is the power (W) required for the acceleration,

$\mathbf{P}_{tyres}$ is the power (W) consumed by the tires,

$\mathbf{P}_{aero}$ is the power (W) consumed by the aerodynamic drag.

The first two terms in (1) describes the rate of change of potential energy (PE) and kinetic energy (KE) associated with climbing and acceleration, respectively. The power required for these actions maybe estimated from the Newtonian mechanics as follows:

$\mathbf{P}_{grade} = d(PE)/dt = Mgv*\sin\theta$ ---------- (2)

And,

$\mathbf{P}_{accel} = d(KE)/dt = d(1/2\ M\ (v\hat{}2))/dt = Mav$----- (3)

Where,

M is the mass (kg) of the vehicle,

v is its velocity,

a is its acceleration,

θ is the gradient.

The last two terms in (1) describe the power which is required to overcome tire friction and aerodynamic drag. The power required here maybe estimated from the following empirical relations,

$\mathbf{P}_{tyres} = CtMgv$---------- (4)

And,

$\mathbf{P}_{aero} = 0.5dCa*A*v3$ ---------- (5)

Where, Ct and Ca are the dimensionless tire friction and aerodynamic drag coefficients respectively.

Journal of Chemical and Pharmaceutical Sciences ISSN: 0974-2115

d is the air density (kg/(m3)).

Future enhancement: Fuel cells can be introduced as the alternate source of energy for the hybrid electric vehicles, which can be implemented in the automatic geared two wheelers. Further, the regenerative braking and runtime charging can be implemented by means of an alternator provided at the engine.

CONCLUSION

The effective transmission system which is employed in the hybrid engine achieves better efficiency and performance even with the low power rating of the machine. This system considerably reduces the smoke and savage of fuel. It is clearly seen that the hybrid economy ensures a cleaner and more economical solution to the energy crisis. The fuels and battery resources are not sustainable and needs further advancement; hence we have to utilize the available technology. Majority of automobile on road is two wheelers, so we are here with the hybridization technology in bike. The reserve of fossil fuels is at dwindling level and this paves the hybrid technology more flexible in the automobile industry

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