Attractive Repulsive Electromagnetic Engine

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Abstract- *Increasing fuel prices and pollution are the major demerits of Internal Combustion Engine. Also presently the demand of fuel has increased at the same time fuel prices are increasing at tremendous rate. Due to which, India has to import this high cost fuel from foreign countries which leads to downfall of GDP. Thus, there is a need of alternative energy to backup the economy. The main aim of project is zero point fuel consumption. Permanent magnets are mounted on upper and lower disc and copper solenoid is used which is driven by suitable voltage battery. Due to this combination of magnet and electricity, phenomenon of electromagnetism is achieved. When current is supplied to solenoid, upper and lower magnet attract and repel respectively and vice versa. Due to which reciprocating motion is obtained which is further converted into rotary motion of crankshaft.*

Keywords- Magnetic force, Windings, Reciprocating, Electromagnets, Attraction, Repulsion.

I. INTRODUCTION

Our project is attractive repulsive electromagnetic engine. The reason behind choosing this project is the present scenario of India that our Govt. is trying to shift from IC Engines which require petroleum to electrically powered engines. So, we have come up with an idea of this dual magnet and solenoid concept [3].

There are other methods in which electrical power is used but we have come with a new idea of attractive repulsive electromagnetic engines which can be used in electrically powered engines[1]. Fossil Fuels are what powers transportation and electricity around the World. The byproducts of Fossil Fuels are changing the climate. The cost and supply of Fossil Fuels affects businesses bottom line. What can businesses do to decrease the Fossil Fuels demands, decrease operating cost, help the environment and increase profits? There is a new engine that does not require Fossil Fuels, does not harm the environment, and has low maintenance cost. The technical name is the Electromagnetic Reciprocating Engine. It is a Mechanical Renewable Energy System. There is a new engine that does not require Fossil Fuels, does not harm the environment, and has low maintenance cost.[2] The technical name is the Electromagnetic Reciprocating Engine. It is a Mechanical Renewable Energy System.

There is requirement of inventing new method of power generation which can be found to be environment friendly. In present scenario the fossil fuel sources are depleting at exponential rate and their combustion products are causing global environmental problems. Though pollution is controlled in combustion engine Nox gas level is increased which leads to damage in ozone layer and also by using other various technology like Exhaust Gas Recirculation (EGR) valve are used the Nox content is reduced but the CO_2 content is increased , due to increase of CO_2 in atmosphere global warming occurs . Since the use of fossil fuel rate is increased day by day, at the year of 2050 the existence of fossil fuel decreases and leads to fuel scarcity. Then where we shall go for fuel? In order to reduce this condition we shift towards the use of alternate fuel which do not require any combustion material so we have chosen magnetic flux to power the engine and decided to design and construct a magnetic engine.

II. COMPONENTS AND DESCRIPTION

2.1 Windings on core

The force that sets up the magnetic field depends on the number of turns on the coil and the magnitude of the current flowing. This force is called the Magneto Motive Force and is measured in Ampere-turn. Winding on Core is 300.

2.2 Core of Solenoid

An electromagnetic coil is formed when an insulated solid copper wire is wound around a core or form to create an inductor or electromagnet. When electricity is passed through a coil, it generates a magnetic field. One loop of wire is usually referred to as a turn or a winding. Core is made up of stainless steel.

2.3 Solenoid Rod

It act as a guiding rod for entire frame which passes throw solenoid. Its end are connected to upper and lower disc. It's also made up of stainless steel.

2.4 Upper Disc

It forms the upper portion of reciprocating member. It contain temporary magnet in it and it is connected to Centre rod at Centre. Material used for it is malleable steel.

2.5 Lower Disc

It forms the lower casing of reciprocating member. It too holds permanent magnet. Its lower end is connected to connecting rod which ultimately connects crank shaft.

2.6 Supporting Rod

It act as supporting member for entire reciprocating frame. It connects upper and lower disc by fasteners. It's made up of aluminum.

2.7 Connecting Rod

Connecting rod is used to connect lower disc and crank ,it forms simple mechanism that convert reciprocating motion into rotating motion. It is made up of forged steel.

2.8 Crank

Crank is arm attached at right angle to rotating shaft by which reciprocating motion is imparted to the shaft other end is attached to the end of connecting rod.

2.9 Shaft

It is mechanical component for transmitting torque and rotation ,which is used to connect other drive components.

2.10 Relay

A relay is an electrically operated switch. It reverses the direction of current flowing through the solenoid, thereby changing the polarity of solenoid. Relay of 12V DC 2 Amp 24 W is used.

2.11 Magnets

Neodymium Ring Magnets. Its attractive force is estimated to be 10 kgs.

III. ASSEMBLY

The Magnetic Chamber uses the magnetic force from an Electromagnet and Permanent Magnet repelling and attracting to each other to turn a crankshaft. The linear motion of the Magnetic Chamber is converted into circular force and torque. The Magnetic Chamber is composed of one Opposite Pole Electromagnet, two Permanent Magnets, three Magnetic Frame Rails, and two Frame Plates.
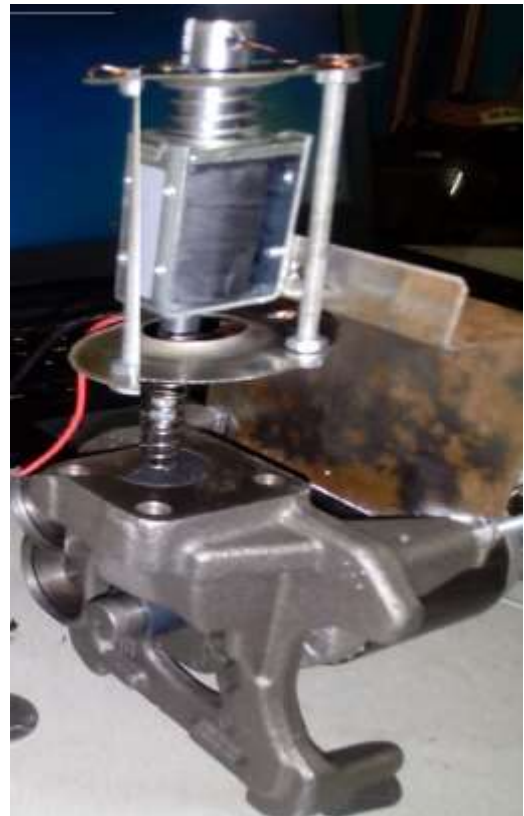

Fig -1: Assembly

IV. WORKING PRINCIPLE

Electromagnetic engine working on principle of attractive and repulsive force produces by temporary and permanent magnet. When the DC current is applied by 12 V battery, a solenoid get magnetised and act as a temporary magnet so that the poles get induced in the solenoid. During the working, opposite pole get attracted and piston move upward. By using polarity changing relay, direction of current get reversed and polarity changes. So similar poles get repels while in other direction, opposite poles get attracted and piston move downward. So that reciprocating motion of piston get converted into rotary motion by using crankshaft mechanism.

V. RESULT AND CALCULATIONS [4]

5.1 Analytical:-

Input voltage = 12 V Input current = 2 A

Input Power $\quad$ = Voltage $\times$ Current

$\qquad$ = $12 \times 2 = 24$ W

Force exerted by electromagnet :

F1 = N2 * I2*K*A/2G.

Where, N = number of turns = 300

I = Current flowing through coil = 2 A

K = Permeability of free space = $4\pi \times 10^{-7}$

A = Cross-sectional area of electromagnet (r = 0.035m)

G = Least distance between electromagnet and magnet is 0.01.

On substitution we get Max Force

F1 =2.9 10^{-3}N.

Force exerted by permanent magnet:

As per the selected neodymium magnet its weight attracting

Capacity is of 5kg.

Thus F2 = 5 * 9.81

= 49.05 N .

Where F2 is force of attraction of upper permanent magnet.

Whereas F3 is force of attraction of lower permanent magnet.

Thus F2 and F3 are same

F2 = F3 =49.05 N.

Total Force :-

F =   F1   +   F2   + F3.

F = 2.9*10^{-3} + 49.05 + 49.05

F = 98.10 N.

Frictional losses are assumed to be 18 %

Friction = 98.10 * 0.18

=17.658 N

Therefore actual force is :-

F = 98.10 – 17.68

F = 80.42 N.

Torque calculation

T = F * r

Where r is radius of crank shaft.

Thus

T = 80.42 * 0.005

= 0.402 N-m

Revolution per minute

30 Rev per 10 sec

Thus N= 180 rpm.

Output power:

OP= 2π NT/60

= 2π *180* 0.402/60

= 7.577 W

Efficiency = O.P./I.P *100

= 7.577/24 *100

= 31.57 % (without load)

VI. CONCLUSION

So here we conclude that the efficiency of our engine is 31.57 % (without load) . By further modification we can improve the efficiency.

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