A Review Of Magnetic Repulsion Engine

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***Abstract* – The prototype model namely 'MAGNETIC REPULSION ENGINE' is the engine works on the repulsion principle of magnets. This engine is similar in construction as that of typical IC engine. t can be used to perform various tasks and functions that involve application of force or displacement of objects. This method provides an environmental friendly, very high efficiency engine that can complement or replace any engines that use fossil fuel, bio-fuel, solar power, wind power, hydro power, electricity, storage energy, or other energy sources. It consists of one magnet fixed at the top of the piston; the magnet is free to reciprocate along with the piston. The second magnet is fixed at the cylinder head. Both the magnets are facing each other with like poles .These engine does not require any input source and works on the magnetic force of its own ,thus it is eco-friendly and can be used in running automobiles ,industrial application, power generation, etc. The engine can be best alternative for any type of fuel consumption engines.**

***Keywords:* - Electromagnet, Ecofriendly, Repulsion**

I. INTRODUCTION

Coal, petroleum, natural gas, water and nuclear energy are the five main energy sources that have played important roles and have been widely used by human beings. Magnetic engines are defined as 2-phases engine which has no exhaust emission, higher efficiency such characters are seen in these kinds of engines.

The prototype model namely 'MAGNETIC REPULSION ENGINE' is the engine works on the repulsion principle of magnets. This engine is similar in construction as that of typical IC engine. It consists of magnet fixed at the top of the piston and another magnet fixed at the piston head. Both the magnets are facing each other with like poles. These engine does not require any input source and works on the magnet force itself, thus it is eco-friendly and can be applied in running automobiles, machines, power generation, and many other applications. In future the field of application of the engine will widen.

Due to the rising fuel costs, environmental issues and diminishing natural fuel reserves, magnetic engine can become a workable alternative to many existing engines. The main advantages of electromagnetic engine are that it is pollution free. Also it is easy to design an electromagnetic engine because there are no complicated parts. Since the engine doesn't have combustion, valves, water cooling system, fuel pump, fuel lines, air and fuel filters and inlet and exhaust manifolds etc. can be eliminated from the engine. The main challenge faced in designing an electromagnetic engine is that it has to be as efficient as an internal combustion engine.

II. LITERATURE REVIEW

Our MAGNETIC ENGINE is inspired by the following inventions as follows;

Radhakrishna Togare who had invented 'MAGNETIC PISTON ENGINE' had mentioned about the running an engine with the help of magnetism by using electromagnet and permanent magnet.

Sherman S. Blalock has mentioned in his 'ELECTROMAGNETIC RECIPROCATING ENGINE' about converting an IC engine to an electromagnetic reciprocating engine by replacing the cylinder with nonmagnetic material and the piston replaced with permanent magnet pistons. An electromagnet is disposed at the outer end of each cylinder whose magnetic field are used for driving the piston.

Benjamin R. Teal who invented 'MAGNETICALLY OPERABLE ENGINE' has mentioned about a combination device for developing a mechanical output from electrical energy which uses at least one electrical magnet solenoid and preferably a plualirity of same. For controlling the time and degree of energization of electrical magnets , timing gears are used.

Mr. Manoj Gattani has invented 'LINEAR MAGNETIC GENERATOR'. He mentioned about producing mechanical and electrical output at same time hereafter referred to as a GOPI GEN . His objective for inventing this model is to provide a high efficient ,zero emission is developed for power production which can lead the path of magnetic piston based alternative power source.

Harold .L. Miller is an inventor of 'PERMANENT MAGNET DRIVE APPARATUS AND OPERATIONAL METHOD'. His invention concerns with reciprocating drive system that performs force and torque conversion by way of magnetic field interaction in between permanent magnets. [1]

Electromagnet

An electromagnetic force is one of the four fundamental interactions of nature. Electromagnetism is the physical interaction between electrically charged particles. As proposed by Sir J C Maxwell, there are majorly four electromagnetic interactions present. First, the force of attraction and repulsion between electric charges is inversely proportional to the square of distance between them. Second, magnetic poles always come in pairs, as electric charges do. Third, current flowing in a conductor produces a magnetic field around it. Lastly a travelling electric field will produce a magnetic field, and vice-versa.

An electromagnet is a type of magnet which possesses the ability to magnetize and demagnetize as and when required. This control is established by an electric current. When current flows, magnetism is expressed, and it vanishes when there is no flow of current. When a wire is closely wound around a cylindrical object, the side faces of the core exert certain poles when current is passed. The reversal of direction of current, changes the magnetic poles across the iron core. When electric current passes around the core, there is and energy generation called magnetic flux. This magnetic flux is responsible for exerting the magnetic force.

Permanent magnets

These are the most common type of magnets that we know and interact with in our daily lives. E.g.; The magnets on our refrigerators. These magnets are permanent in the sense that once they have been magnetized they retain a certain degree of magnetism. Permanent magnets are generally made of ferromagnetic material. Such material consists of atoms and molecules that each have a magnetic field and are positioned to reinforce each other.

Permanent Magnets can be classified into four types based on their composition:
1. Neodymium Iron Boron (NdFeB or NIB)
2. Samarium Cobalt (SmCo)
3. Alnico
4. Ceramic or Ferrite

NIB and SmCo are the strongest types of magnets and are very difficult to demagnetize. They are also known as rare earth magnets since their compounds come from the rare earth or Lathanoid series of elements in the periodic table. The 1970s and 80s saw the development of these magnets. Alnico is a compound made of ALuminium, NIckel and CObalt. Alnico magnets are commonly used magnets and first became popular around the 1940s. Alnico magnets are not as strong as NIB and SmCo and can be easily demagnetized. This magnet is however, least affected by temperature. This is also the reason why bar magnets and horseshoes have to be taken care of to prevent them from losing their magnetic properties. Ceramic or Ferrite magnets are the most popular today. They were first developed in the 1960's. These are fairly strong magnets but their magnetic strength varies greatly with variations in temperature.Permanent Magnets can also be classified into Injection Molded and Flexible magnets. Injection molded magnets are a composite of various types of resin and magnetic powders, allowing parts of complex shapes to be manufactured by injection molding. The physical and magnetic properties of the product depend on the raw materials, but are generally lower in magnetic strength and resemble plastics in their physical properties. Flexible magnets are similar to injection molded magnets, using a flexible resin or binder such as vinyl, and produced in flat strips or sheets. These magnets are lower in magnetic strength but can be very flexible, depending on the binder used.

Permanent magnets can be demagnetized in the following ways: - Heat - Heating a magnet until it is red hot, makes the magnetic properties to fail - Contact with another magnet - Stroking one magnet with another in a random fashion, will demagnetize the magnet being stroked. - Hammering or jarring will loosen the magnet's atoms from their magnetic attraction.[2]

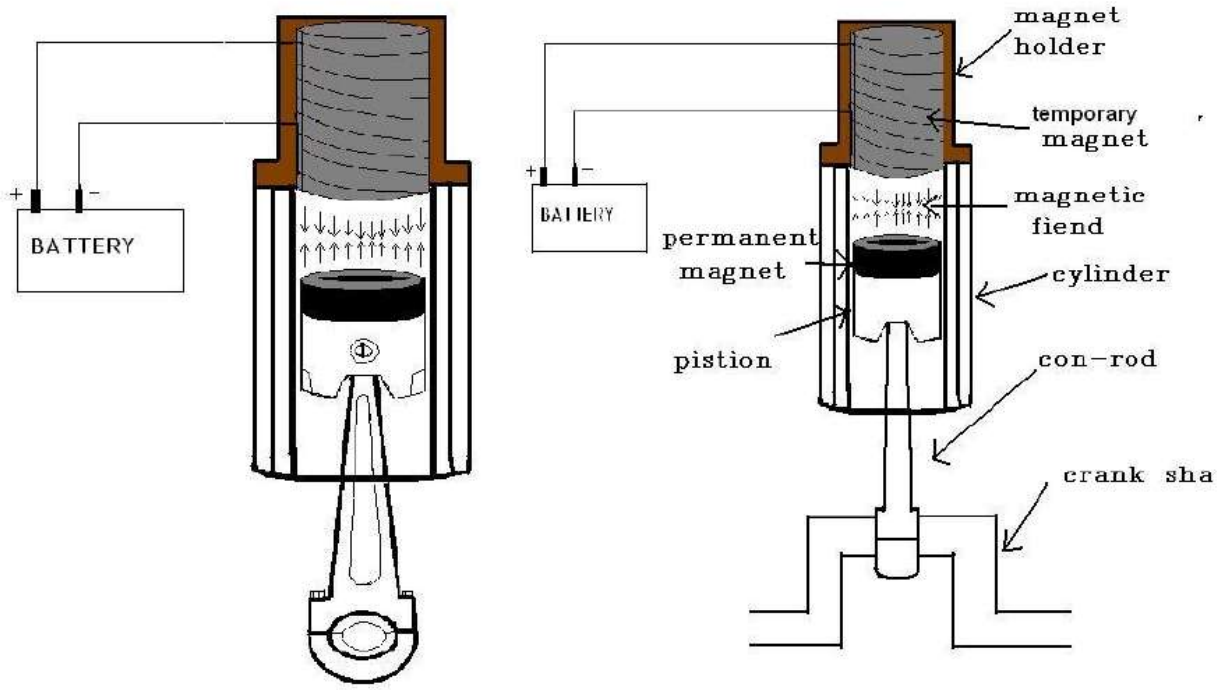
III . CONSTRUCTION

A MAGNETIC REPULSION ENGINE consists of a non-magnetic cylinder, piston with connecting rod ,flywheel and crank shaft arrangement ,and a pair of permanent magnets. The construction of these engine is similar as that of typical IC engine. Here ,the spark plug and valves at the cylinder head is replaced by a permanent magnet. Another permanent magnet is placed at the top of the piston which can freely reciprocates along with the piston. Both the magnets are arranged in such a way that there surfaces are facing each other with like poles. Small openings are provided at the cylinder for natural air circulation.

IV. WORKING

As the name suggest, the MAGNETIC REPULSION ENGINE will work on the principle of magnetism. When the piston at the BDC is provided with initial cranking effort ,it will move from BDC to TDC causing 180^{o} rotation of crank shaft. As the magnet placed at the top of the piston and magnet fix at cylinder head are facing each other with like poles ,the repulsion force will start acting on both the magnets . Minimum the distance between the magnets will cause higher repulsion force . Therefore when piston reaches at TDC ,the repulsion force will repel the magnets and thus the magnetic piston will move downward from TDC to BDC causing further 180^{o} rotation of crank shaft and thus one complete rotation of crank shaft is obtained . After piston reaches BDC the flywheel will pull the piston back towards TDC and thus cycle repeats. The engine will work on two stroke i.e compression and power stroke. In this system, a permanent neodymium iron-boron magnet was adhered to the top surface of the piston. Hence the magnet travelled along with the piston with reciprocating motion. So there were two magnets stuck to each piston which reciprocated within the cylinder. The magnets were fixed in such a way that the pole orientation was in the same direction. For e.g. if the south poles of both the magnets were fixed to piston surface, then the north poles were exposed to the atmosphere.

V. WORKING DIAGRAM



VI. TECHNICAL SPECIFICATION

Sr. No.	*Component*	*Qty.*	*Material / Type*
1.	CYLINDER	1	CAST IRON
2.	PISTON	1	ALUMINUM
3.	CONNECTING ROD	1	CAST IRON
4.	BELT	1	RUBBER
5.	CRANK SHAFT	1	ALUMINUM
6.	PULLEY	1	MILD STEEL
7.	MAGNETS	2	NdFeB (N45)

VII. FUTURE SCOPE

As in present condition humans are heading toward the use of sources of energy which are pollution free and eco-friendly. Thus the magnetic piston engine can be used as a better alternatives. It can be used to perform various tasks and function that involve application of force or displacement of objects. This engine is highly efficient as it does not uses any input source and it works on its own power. It has the possibility of reaching unity-over operation mode. It has the capability to replace the electric motors and any engine which requires fuel burning to operate. As these prototype model consists of only one piston and only one pole of magnet is used for running the engine,in future modification can be made to it by using two magnetic piston on both side of the fixed magnet to make use of both the poles of magnet and to achieve high power and more effective use of magnets.

VIII. CONCLUSION

Hence, we have successfully and deeply learned about various types of magnets, their grades, power, availability, operating condition, factors affecting magnet power and many more. We have also learned about the difference between theoretical concept (i.e. design and working) and actual concept of the engine. Also, we learned about various difficulties arising during actual construction of engine. Due to these project we got very important information related to magnets and various magnetically operating engines and various efforts being made all over the world for developing an engine which are highly efficient, eco-friendly and will run indefinitely.

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