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Extended Abstract

Conversion of IC Engine into Magnetic Engine with Minor Modifications

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Abstract

Internal combustion engines are one of the major causes of pollution. These engines work by burning fuels, hence contaminating environment through the exhaust. Due to the mentioned reason, there is a need of an alternate technology which is reusable and environment-friendly. As an effort to control the effects of engine emissions, this research suggests an alternative technique known as Magnetic Repulsion Piston Engine (MRPE). MRPE is an environment-friendly and non-polluting engine that works on the principle of repulsion between same poles of the magnet. The aim of this research is to manufacture such an engine that can use the repulsion between the same poles of the magnet to produce power and rotate the crankshaft without changing the design of the IC engines. MRPE uses a permanent and an electromagnet to achieve repulsion. The permanent magnet is attached upon the piston whereas the electromagnet replaces the cam valve mechanism. This arrangement with the proper current timing of electromagnet drives the crankshaft. The modifications are made to one-cylinder IC engine for this particular study. Successful running of the engine using the magnet attraction and repulsion is achieved. The engine produced only 189 rpm under no load.

Keywords:

MRPE (Magnetic repulsive piston engine); Electromotive force; Magnetic flux; Neodymium; IC or conventional engines

Introduction

This research relates to automotive industry and green technology. The conventional piston engines of our cars run on igniting gas or oil and create a burst which lowers the piston, discharging billion of ton of CO_2 into the atmosphere. The Environmental Protection Agency had stated that carbon dioxide emission poses a threat to health. Therefore it's important to find solutions to noise, environment and health risks posed by the conventional internal combustion engine .For this purpose, an idea of a magnetic repulsive piston engine (hereinafter referred to as MRPE) for replacing the IC engines is presented. This engine doesn't have any emission that poses threat to the environment.

Methodology

When same poles of two magnets are brought near, then they will repel each other and will move into the opposite direction and when the opposite poles of the magnets are brought nearer from far distance than they will feel the attractive force and will start moving towards each other. This phenomenon is utilized to design an engine using permanent and electromagnet.

The study was carried out after various design modifications and magnet arrangements. The final arrangement used in the study is mounting the permanent magnet on the piston whereas electromagnet at the top of the cylinder at Top Dead Centre position. The battery was attached to the electromagnet that energized the electromagnet when the piston reached TDC position.

Component Design

The design of the magnetic repulsive engine is similar to conventional engine design. The electromagnet was positioned at TDC position of the engine cylinder replacing CAM mechanism and the permanent magnet was bolted on the piston. The engine piston was connected to the crankshaft via the connecting rod. The connecting rod was connected by means of a piston pin with the crankshaft. The description of each component is given below

Design Specifications

The design of the engine was kept same as the conventional one cylinder 4 stroke internal combustion engine. Engine head was replaced by an

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electromagnet which gets energized by battery and current was controlled by a sensor. Permanent magnet used was Neodymium grade N52 that was mounted on the custom-made piston. Figure 17 shows the assembly of the engine.

When the piston was at TDC position, battery energized the electromagnet in a way the opposite poles are in front of each other and hence repelled the piston. As the piston moved to BDC position electromagnet de-energized and piston easily came back to TDC by the energy stored in the flywheel.

Experimental Results

A series of the experiment was performed and different results were obtained. At 3A ampere current the electromagnet did not magnetize so an addition battery was used and 8 A current was supplied. The core magnetized and pushed the piston downward but there was some interruption in the movement. So, cylinder boring was done and dia. of the cylinder was increased to 56 mm. The piston smoothly moved in the cylinder. The power of the magnet was not enough that it could push the piston downward that it could not come back upward

A battery of 44A was used than the magnet attraction distance was experienced at a distance of 108 mm while the cylinder length was 98 mm so this also stopped the magnet attached to the piston to come up again but the timing could be adjusted. The results of current versus rpm are tabulated in Table 2 below.

Conclusion

Thus, the idea of running a magnetic repulsive engine without changing the design of conventional engines was practically achieved through proper experiment. Still, the efficiency is not enough that it can be implemented in industry. One thing is achieved regarding industrial implementation was that the design can be implemented without changing the setup of the industry completely.

References

1. Hota P, Rathore M, Shaikh D (2014) Magnetic repulsion piston engine. Int J Sci and Resrch 4: 338-344.
2. Butler K (2015) Electromagnetic reciprocating engine white paper. Innovative Energy Policies 4: 118-129.
3. Wu L, Xia Z (2016) Research on centrifugal casting of combustion engine cylinder. 2nd Int Conf on Control, Automation and Robotics (ICCAR) 268-272.
4. Rahman MM, Kim KT, Hur J (2013) Design and analysis of neodymium free SPOKE-type motor with segmented wing shape permanent-magnet for concentrating flux density. IEEE Energy Conversion Cong and Expo 4991- 4997.
5. Spyra M and Leonowicz M (2008) Structure and magnetic properties of low neodymium magnets containing minor addition of molybdenum. IEEE Trans on Mag 44: 4247-42249.
6. Kondratenko Y, Zaporozhets Y, Rudolph J, Gerasin O, Topalov A, et al. (2017) Features of clamping electromagnets using in wheel mobile robots and modeling of their interaction with ferromagnetic plate. 9th IEEE Int Conf on Intelligent Data Acquisition and Advanced Comp Sys: Tech and App (IDAACS) 453-458.

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