

## Solenoid Engine

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### ABSTRACT

Combustion takes place & produces heat which converts into mechanical energy. We know IC-Engines are used in Automobiles, Aero plane etc. But the incomplete combustion produces some harmful gasses, which is one main cause of air pollution. Modern Science & Technology has been taken many positive steps for emission control. Like, using CNGs & LPGs instead of petrol & diesel. Now technology brings Electrical bikes, scooters & cars. The battery of electrical vehicle can charge easily like mobile. They have less running cost & 100% emission free. But they have very less load carrying capacity & not suitable for long run. So basically we have to prefer Engines for more power & more running capacity. Here I have introduced a mechanism which has more load caring & running capacity then electrical vehicles but make zero emission or pollution

**Keywords:-** CNG, LPG

### I. INTRODUCTION

This project is about to design electricity operated engine construction. In this engine there is no use of fuels like diesel and petrol. So this engine is operating on pure electricity coming from a battery source. An electromagnet is positioned on the top of the cylinder, while construction of engine is traditional. And piston is just a permanent magnet (Neodymium magnet). There is no combustion within the cylinder so design of piston and cylinder arrangement is simpler as compared to IC Engine. So the accuracy of dimensions is not a serious matter here. Although this engine can't produces any flue gases which are harmful to the environment, because there is no combustion of fossil fuels in this engine.

### II. LITERATURE SURVEY

#### Electromagnetic Reciprocating Engine Kala

**Butler:** Business has been looking to end its dependency on Oil. Oil supplies are dwindling, the demand is increasing along with the cost. The Electromagnetic Reciprocating Engine, for which Sekou holds the patent, can replace the Combustion Engine; it does not use any fossil fuels. The Electromagnetic Reciprocating Engine can replace the Combustion Engine in any vehicle, eliminating

the fuel cost. The Electromagnetic Reciprocating Engine can replace the Combustion Engine in an engine-generator, creating green renewable electricity. The Electromagnetic Reciprocating Engine has a low operating cost with an 110,000 hour or 12 year maintenance cycle. The Electromagnetic Reciprocating Engine can end the need for fossil fuels in transportation and electricity production for homes and businesses.

### III. COMPONENTS

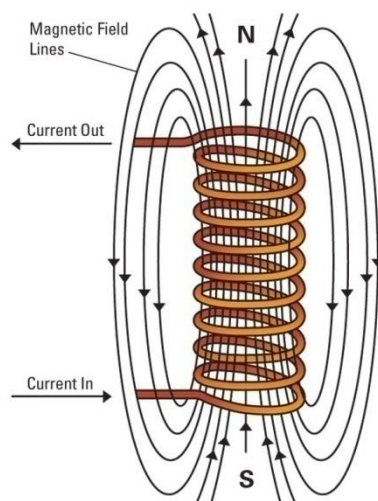
- Electromagnetic solenoid
- Connecting rod
- Proximity sensor
- Relay
- Crank
- Fly Wheel

#### Electro magnetic solenoid:

When a current carrying conduct or is wound on a magnetic material(ferrite),it acts as a magnet till the conductor is live. An air core electromagnet that acts as a solenoid is used here. Since it has an air core, the core losses are eliminated.

The electricity magnetizes the electromagnet, and when the current jumps to unsafe levels, the electromagnet is strong enough to pull down a metal lever connected to the switch linkage.

The electromagnet provides the driving force to close the contacts, which are the current carrying part of the contactor. An electromagnet is a temporary magnet formed by winding a coil of wire round a piece of soft iron, and passing an electric current through it.



#### IV. CONNECTING ROD

A connecting rod is a shaft which connects a piston to a crank or crankshaft in a reciprocating engine. Together with the crank, it forms a simple mechanism that converts reciprocating motion into rotating motion. A connecting rod may also convert rotating motion into reciprocating motion, its original use. Earlier mechanisms, such as the chain, could only impart pulling motion. Being rigid, a connecting rod may transmit either push or pull, allowing the rod to rotate the crank through both halves of a revolution. In a few two-stroke engines the connecting rod is only required to push.

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#### PROXIMITY SENSOR

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.

A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal.

The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

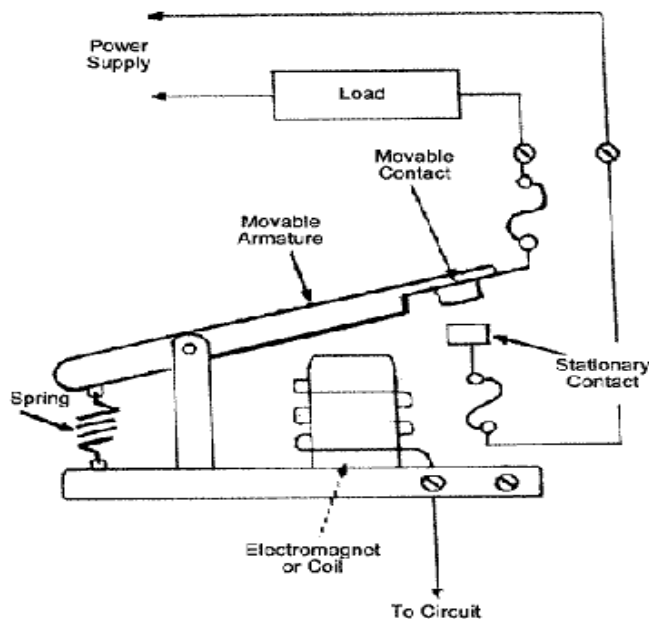
The maximum distance that this sensor can detect is defined "nominal range". Some sensors have adjustments of the nominal range or means to report a graduated detection distance. Some know these processes as "thermo sensation".

Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.



### RELAY

A relay is an electrically operated or electromechanical switch composed of an electromagnet, an armature, a spring and a set of electrical contacts. The electromagnetic switch is operated by a small electric current that turns a larger current on or off by either releasing or retracting the armature contact, thereby cutting or completing the circuit.



### CRANK

A crankshaft—related to crank—is a mechanical part able to perform a conversion between reciprocating motion and rotational motion. In a reciprocating engine, it translates reciprocating motion of the piston into rotational motion; whereas in a reciprocating compressor, it converts the rotational motion into reciprocating motion.

In order to do the conversion between two motions, the crankshaft has "crank throws" or "crankpins", additional bearing surfaces whose axis is offset from that of the crank, to which the "big ends" of the connecting rods from each cylinder attach.

It is typically connected to a flywheel to reduce the pulsation characteristic of the four-stroke cycle, and sometimes a torsional or vibrational damper at the opposite end, to reduce the tensional vibrations often caused along the length of the crankshaft by the cylinders farthest from the output end acting on the torsional elasticity of the metal.

### WHEEL

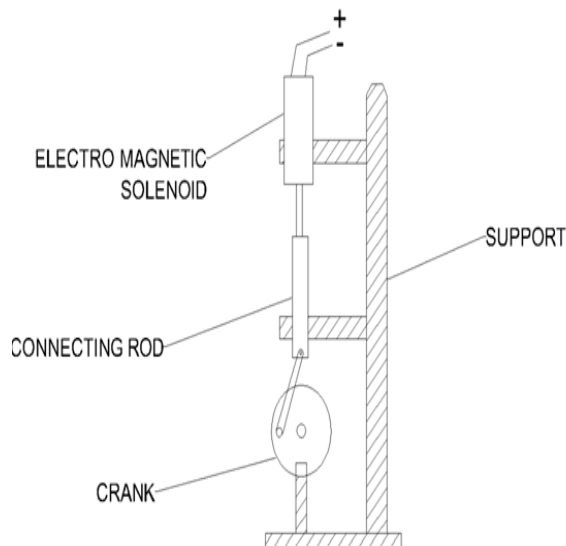
A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel.

Common examples are found in transport applications. A wheel greatly reduces friction by facilitating motion by rolling together with the use of axles. In order for wheels to rotate, a moment needs to be applied to the wheel about its axis, either by way of gravity or by the application of another external force or torque. Using the wheel Sumerians invented a contraption that spins clay as a potter shapes it into the desired object.

The wheel and axle is one of six simple machines identified by Renaissance scientists drawing from Greek texts on technology.[1] The wheel and axle consists of a wheel attached to a smaller axle so that these two parts rotate together in which a force is transferred from one to the other. A hinge or bearing supports the axle, allowing rotation. It can amplify force; a small force applied to the periphery of the large wheel can move a larger load attached to the axle.

The wheel and axle can be viewed as a version of the lever, with a drive force applied tangentially to the perimeter of the wheel and a load force applied to the axle, respectively, that are balanced around the hinge which is the fulcrum. The mechanical advantage of the wheel and axle is the ratio of the distances from the fulcrum to the applied loads, or what is the same thing the ratio of the diameter of the wheel and axle.[2] A major application is in wheeled vehicles, in which the wheel and axle are used to reduce of the moving vehicle with the ground. Other examples of devices which use the wheel and axle are capstans, belt drives and gears.

### BLOCK DIAGRAM



### WORKING PROCESS

The working of solenoid engine was based on electromagnetism principle. When current passes through the conductor the magnetic flux will be generated around the conductor this phenomenon is known as electro magnetism. At first when we flick the fly wheel it rotates the crank shaft and a non uniform circular disk, mounted on the crank shaft. During the half the revolution of non uniform circular disk the inductive proximity sensor on's hence the current flows to the solenoid coil trough the relay, and the solenoid coil act as electro magnet due to this effect, piston moves in to the cylinder. While the other half the revolution of the non uniform circular disk the inductive proximity sensor off's hence the current doesn't in to the solenoid coil hence the piston comes out of the solenoid coil and the cycle repeats

### ADVANTAGES

1. It has less running cost than an Engine.
2. It does not make pollution (basically air pollution) & can help to check Global warming.
3. It takes less amount of charge from battery in every revolution of crank shaft for few fractions of seconds.
4. It can produce much more power & running capacity than battery car & bikes.

This cannot produce much power like an IC-Engine but can be use as an equivalent system of an engine & it is acceptable for future ene

### DISADVANTAGES

1. It cannot produces power like an engine.
2. It can provide less uniform torque at cranks engine
3. It is not applicable for multi-cylinder system.

### PHOTOGRAPHIC VIEW



### V. CONCLUSION

The electromagnetic engine has various advantages. The main advantage is, no fuel is being used in the engine. This results into no pollution which is very need in the present day situation. As there is no any type of combustion taking place inside the cylinder there is only very little heat generation by the coils. This eliminates the need for a cooling system and desirable for any automobile. As magnetic energy is being used the need for air filter, fuel tank, supply system, fuel filter, fuel injector, fuel pump, valves etc. are neglected and the design of the engine is made simple. Also by the use of materials like Aluminum, titanium etc. we can reduce the weight of the electromagnetic engine. Also existing transmission systems can be used in the electromagnetic engine. Less noise is produce during working. The disadvantage of this engine is its high initial cost. The electromagnet and permanent magnet can be costly.

Also the power of the permanent magnet will decrease during time and the permanent magnet has to be replaced during limited periods. The engine is not as flexible as the internal combustion engine. The engine power source is battery. The number of

batteries will vary according to the requirement. In high power engines, the number of batteries will increase which maybe increase the total weight of vehicle and consume a lot of space. Also the batteries needs to be charged regularly which is difficult and time consuming. So the engine is not dependable the prototype is an idea which uses the property of an electromagnet by property of which it changes the polarity of its poles whenever the direction of current is changed. This variation in polarity is utilized to attraction or repulsion the permanent magnet attached to the piston. Also, by inserting more permanent magnets in series on the piston will enhance the output of the engine. By slight modification in design and by the use of better hands the engine can be modified to generate more power, hereby increasing its efficiency, so it can be used in commercial vehicles and other applications.

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