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Mechanical Work Generation Via Magnetic Arrangement

Parul Bansal[1], Shivam Pratap Singh[1],Utkarsh Soni[1],Vikas Maharia[1], Yash Pareek[1], Yash Vardhan[1], Sunil Sharma[2]

1. Students, Global Institute of Technology, Jaipur
2. Assistant Professor, Department of Mechanical Engineering, Global Institute of Technology, Jaipur

***ABSTRACT*: Mechanical Work is a key to technology we see a lot of mechanical work in daily life, like Rotatory motion, Frictional motion, etc. This design here generates mechanical work with the help of a magnetic arrangement. Mechanical Work generation via magnetic arrangementproject is based on the mechanical work generatedfrom the repulsion magnets. The basic idea is to arrange three magnets in such a way that the one magnet will generate motion due to the repulsion generated by the two other magnets. We will make an arrangement where the three magnets are arranged linearly and the magnet at the centre will be facing the same poles to the magnets at both ends. Via this arrangement when the centralmagnet is provided with an initial motion, then due to the repulsion from the magnets at the end it will generate the motion in the centralized magnet. As the demand for energy increases day-by-day, we need this alternative system to fulfil the need. This device also facilitates with less consumption of fuel and it is also a pollution-free energy source.**

Keypoints: mechanical work, magnetism.

I. INTRODUCTION

Mechanical Work generation via magnetic arrangement is the project based on the mechanical work generatedfrom the repulsion magnets. The basic idea is to arrange three magnets in such a way that the one magnet will generate motion due to the repulsion generated by the two other magnets. We have made an arrangement where the three magnets are arranged linearly and the magnet at the centre is facing the same poles to the magnets at both ends. Via this arrangement when the centralmagnet is provided with an initial motion, then due to therepulsion from the magnets at the end it will generate the motion in the centralized magnet.

We have set-up the magnetic arrangement in a non-metallic component to avoid the attraction of the magnets to the component. We have attached a Connecting Rod to the centre magnet to obtain the motion from the magnet. The Intermediate link will be attached to the Derailleur/Chain wheel of the cycle which will provide the generated motion from the magnets to the rear wheel of the cycle. Higher the repulsion from the magnet the higher will be the speed because attraction and repulsion in magnets arises inbetween electricallycharged particles because of their motion. The motion of charged particles is the force responsible for such effects as the action of electricmotors and the attraction of magnets for iron. [1]

This system needs an initial force to execute properly. When the initial force is applied via paddle, it will provide the motion to the magnets as the middle magnet is attached to the connecting rod which will conceive motion from connecting bar and intermediate link.

Using this arrangement of magnets, connecting rod, intermediate link and cyclic system to execute motion we will produce mechanical work.

II. PROBLEM STATEMENT

Nowadays people are completely dependent on the automotive for the transportation and travelling purposes, the world is shifting towards the sustainable sources for such purposes but all those modes are expensive and it can't be afforded by a common man.

We have made a system which when implemented could reduce the prices and it is also sustainable.

III. OBJECTIVE

The main objective to make such a system are as follows:

1. Betterment in existing technology.
2. To reduce the usage of fossil fuels.
3. To enhance the speed of the shaft by using Magnetic arrangement.
4. To amplify the overall speed of the automobiles.

IV. CONCEPTUAL DESIGN

We have implemented this system on the cycle as it is convenient to obtain the results. We have implemented the non- metallic casing just above the wheels and it is in the centre of the rear and the front wheel as it is easier to achieve motion from that position. The non-metallic cylinder has a small opening to transfer the motion of magnet to the connecting rod. The connecting rod is pivoted from the centre and the other end of the rod is attached to the intermediate link which is then attached to the crank arm.

Ideally,a neodymium magnet (also known as NdFeB, NIB or Neo magnet) is best for the system. It is a permanent magnet made from an alloy of neodymium, iron, and boron to form the $Nd_2Fe_{14}B$

tetragonal crystalline structure.Developed independently in 1984 by General Motors and Sumitomo Special Metals, neodymium magnets are the strongest type of permanent magnet available commercially. Because of different manufacturing processes, they are divided into two subcategories, namely sintered NdFeB magnets and bonded NdFeB magnets. They have replaced other types of magnets in many applications in modern products that require strong permanent magnets, such as electric motors in cordless tools, hard disk drives and magnetic fasteners. [2]

The system which transfers motion to the cycle is very much similar to the Four Bar Chain mechanism. A four-bar linkage, also called a four-bar, is the simplest movable closed-chain linkage. It consists of four bodies, called bars or links, connected in a loop by four joints. Generally, the joints are configured so the links move in parallel planes, and the assembly is called a planar four-bar linkage [3]; Spherical and spatial four-bar linkages also exist and are used in practice.

Varying the lengths of the links can cause the output to speed up or slow down and describe a different arc to the input. The lengths of links can be arranged such that a continuous Rotary Motion-input can result in an output with Oscillatory Motion. [4]

V. COMPONENTS ATTACHED

The main components of the setup are,

1. 3 Magnets: The magnets arranged in such a way that the centre magnet is facing opposite ends to the other two magnets in
   the casing.

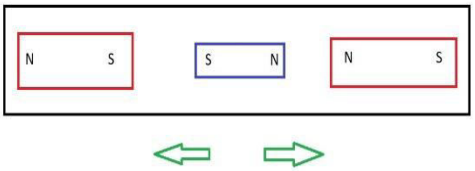

Fig-1: Magnetic Arrangement

2. Non- Metallic Casing: A non-metallic casing is used to avoid the attraction of the magnets to the casing.

Fig-2: Sectional Casing

3. Connecting Rod:It converts the reciprocating motion of the magnets into the rotation motion of the wheel.
4. Crank Bar:A crank is an arm attached at a right angle to a rotating shaft.
5. Intermediate Link: It is the connecting link of Crank Bar and Connecting Rod.

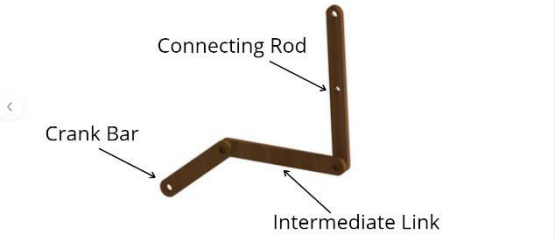

Fig-3:CrankBar, Connecting Rod & Intermediate Link

6. Cyclic Arrangement: The motion obtained from the magnetic arrangement is used here.

Fig -4: Cyclic Arrangement

VI. METHODOLOGY

We have set-up the magnetic arrangement in a non-metallic component to avoid the attraction of the magnets to the component. We have attached a Connecting Rod to the centre magnet to obtain the motion from the magnet.It converts the reciprocating motion of the magnets into the rotation motion of the wheel[5];The Crank Arm is attached to the Derailleur/Chain wheel of the cycle which is used to provide the generated motion from the magnets to the rear wheel of the cycle. Higher the repulsion from the magnet the higher will be the speed or the rotation per minute (RPM) of the rear wheel of the cycle.

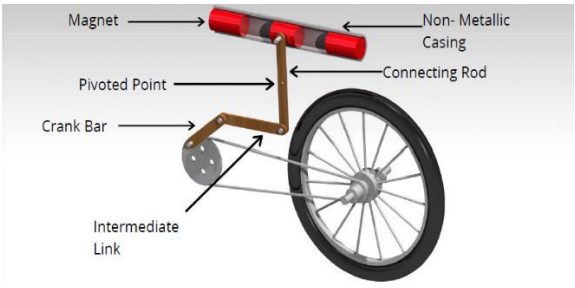

Fig -5: Representation of Components

VII. CALCULATIONS

- Diameter of Magnet = 30cm
- Thickness of Magnet = 20cm
- Distance between Magnet = 10cm
- Repulsive Force = 22.37lb = 99.5N
- Magnetic Casing Length = 80cm

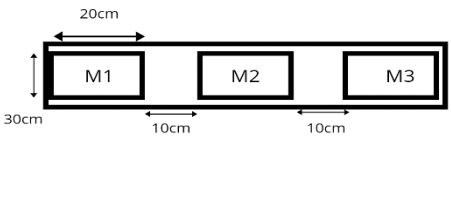

Fig-6: Dimension & Spacing of Magnets

Considering,

- Force ($F_{applied}$) = 100N
- Paddle Radius (R_1) = 12cm
- Spocket Radius (r_1) = 10cm
- Gear Radius (r_2) = 3cm
- Rear Wheel Radius (R_2) = 30cm

Torque at paddle = $F_{applied}$xR_1

= 100 x 12

= 12Nm

VIII. CONCLUSION

It can revolutionize on the whole new level of work and power generation; with the use of this technology, we can reduce the usage of fossil fuels. We can also improve the efficiency of the mobile and the non-mobile machine components. We can run the machinerytotally without the usage of the fuels they can only run over the magnetic arrangement. Sustainability is the most important factor we can obtain through this medium. We can also use the Magnetic arrangement and the fuel consumption simultaneously which would lead to the higher speed of the shaft, through this medium we can amplify the overall speed of the automobiles.

IX. FUTURE SCOPE

The mechanism can be very fruitful for obtaining the mechanism work on cycles and fans if the magnets with the higher magnetic field is used it can generate lots of power. We can implement it for various operations such as for pumps, compressors and also in auto-motion. The mechanical work generation with magnets may lead to the fuel-less vehicles in future. The work generation is entirely dependent on the repulsion generated and the magnetic field lines of the magnets. It can also be used in various types of machineryand also in the industrial components. The overall efficiency of the vehicle can also be improved via this arrangement.

X. APPLICATIONS

1. Automobile.
2. Mechanical Equipment.
3. Industrial Machinery.
4. Pumps

XI. ADVANTAGES

1. It is fuel-free, so the running cost is less.
2. Lesser maintenance cost.
3. Works on dual-mode (Magnetic arrangement & Manual effort).
4. Environment friendly.

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