Frictionless Energy Generation Using Flywheel

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Abstract—Energy generation system plays a very important role in recent years. For age’s flywheel have been used to store rotational energy and smooth operation of machine. In present time flywheel has many different part where energy is store and transferred from flywheel to battery or motor. This is done with the help of magnet and copper winding arrangement. One of the key part of this system is high overall efficiency hence reduction of total frictional losses. The inertia of flywheel can be increased by increasing the size of flywheel. The result showed that energy generation can be achieved by flywheel without any friction.

Keywords—Electricity generation, Gravity, Neodymium magnet, flywheel, copper winding, Free energy.

I. INTRODUCTION
Combining this is a mechanical device which uses the flywheel to store energy in the form of inertia. Let us explain all the system. In this system we apply extra energy source to start the main motor like electricity or by applying the mechanical energy. In this system a main motor is used to drive a series of pulley and belt arrangement which forms a gear train arrangement which produce a twice speed at the shaft of generator.

The intriguing thing about this system is that greater electrical can be drawn from the output generator than appears to be drawn from the input drive to the motor. The inertia of flywheel can be increase by increasing the radius of flywheel, weight of flywheel.

Firstly, the requirement for an effective system needs to be a suitable flywheel with as large a diameter as is practical, and vast majority of the weight needs to be close to rim. The construction needs to be robust and secure as ideally, the rate of rotation will be high as possible, and of course.

The wheel increases if the flywheel weight is concentrated as far out toward the rim of the flywheel as is possible. Needs to be exactly at right angles to the axle on which it rotates and exactly cantered on the axle. The main motor is low speed and low voltage input motor and the generator is high speed and high voltage output generator. So, when we apply an extra energy to the main motor it starts running.

This causes to rotate the flywheel. When the motor is reaches the highest speed (constant speed) we switch the power by applying the electrical energy generated by the generator. We add the extra thing in the system like transformers, inverter, any extra needed circuits etc. to run the system and take the efficiency output.

II. METHODOLOGY
We are using the wheel of cycle which is connected to the pulley which is mounted on the same shaft and its diameter is less the wheel diameter due to which the speed of rotation can be increased.
On another shaft which is connected to the pulley is having the assembly of flywheel and Neodymium magnet-coil arrangement.

Flywheel will store the kinetic energy while wheel is running condition and will release the kinetic energy when brake is applied on the wheel.

So, use of flywheel it provides such kind of energy which is help run the cycle by less efficient power. Neodymium magnet will start rotating shaft and coil is steady. So here electro motive force is produced from magnet and coil arrangement. By this way power will generate and store it into battery.

2.1. Design component
2.1.1. Rotor (Flywheel): The free energy generator in which the generation of energy from flywheel. The kinetic energy stored in a FW is corresponding to the moment of inertia and to the square of its rotational speed as follows: \( E = \frac{1}{2}J\omega^2 \).
2.1.2. Shaft: We are using two shafts in the system and to ensure maximum energy transfer with minimum loss.
2.1.3. Bearing: Bearing selection is also important in order to ensure smooth and long life.
2.1.4. Chain Drive: Chain drive is useful for power transmission using sprocket. We select the drive as per standard criteria.

*Fig:- Working Setup*

III. WORKING PRINCIPLE

When the motor or engine shaft rotates, it transfers the rotary motion to the first shaft by using belt and pulley. It rotates free wheel hence it rotates bicycle wheel. Freewheel transfer its motion to the next flywheel shaft by using chain and sprocket mechanism. Hence it rotate flywheel. Here the flywheel takes a part still it rotates as its work to save energy we are utilizing this rotary energy to generate electricity.

Flywheel carries strong magnets which are different from normal magnets called as Neodymium magnets; it is in the form of coin. In front of the flywheel there is one stationary wheel attached to frame and it carries coil arrangement. There is no physical contact like Dynamo with flywheel, hence there is no friction. In this magnets and coils arrangement there is same amount of magnets as well as coils.
When we apply brakes bicycle wheel stop rotating but freewheel rotate for some time and it rotate flywheel, EMF induced in the coil and it generates electricity. This energy stored into the battery. This stored energy can be used for charge mobiles and lighting purposes.

**IV. CALCULATIONS AND RESULTS**

Given: \( \dot{\omega} = 30 \text{ rad/s} \), \( C_s = 0.2 \), \( t = 25 \text{mm} \), \( \mu = 0.3 \), \( \rho = 7800 \text{ kg/m}^3 \)

Energy output from flywheel (Uo). The turning moment diagram shown in fig. .

The mean torque \((T)\) supplied by the motor is given by,

\[
T = \frac{\text{Area OABG}}{\text{Length OG}} = \frac{\left(\frac{500+1500}{2}\right)}{(2\pi)} = 1000 \text{ N-m}
\]

The maximum and minimum angular velocities occur at point E and B respectively.

\[
U_o = \text{Area of EBF} = \frac{1}{2} * BF*EF = \frac{1}{2}*(1500-1000)(2\pi-\pi) = (250\pi) \text{ N-m or J}
\]

Outer radius of flywheel

\[
I = \frac{U_o}{\dot{\omega}} = \frac{(250\pi)}{(30*30*0.2)} = 4.3633 \text{ kg-m}^2
\]

\[
I = \frac{\pi}{2} * \rho t R^4 \quad \text{or} \quad (4.3633) = \frac{\pi}{2}(78000)*(25/1000)*R^4
\]

\[
R = 34.54 \text{ cm}
\]

Radius of flywheel is 34.54 cm.

![Turning Moment Diagram](image)

**Fig: Turning Moment Diagram**

**4.1.1 Results**

<table>
<thead>
<tr>
<th>Magnet use</th>
<th>Time for revolution (per min)</th>
<th>Voltage generated (volt)</th>
<th>Flywheel turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrite</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Neodymium</td>
<td>1</td>
<td>15</td>
<td>4</td>
</tr>
</tbody>
</table>

**V. LITERATURE REVIEW**

5.1 K. Ghedamsi- “The flywheel energy storage system (FESS) is suitable for improving the quality of the electrical power deliver by electric motor”.

5.2 Jamie Patterson, 2004 “The broad goal of this project was the development and demonstration of a complete prototype flywheel power system and successful proof of the feasibility of this energy storage technology”.

5.3 Michaen Mathew, 2009 “Flywheel serve as a kinetic energy storage and retrieval device with the ability to deliver output power at high rotational speed as bring one of the emerging energy storage technologies available today in various stages of development is specially advanced technological areas.”
5.4 B. Sneha, dr. M. Damodar reddy, October 2015, “Generation of power from bicycle pedal.” It is known that the supply of fossil fuels are scarce and their use as energy source case environmental degradation, in addition to this as the world population increases the energy demand is also increasing day by day, so we are in a search a new renewable sources. In this paper an easy way to generating power at small levels by using bicycle pedals was analyzed.

5.5 Suraj A. Sevatkar, Eknath M. Pise, Pravin S. Ghawade, “Desing and fabrication of flywheel on bicycle used as a kinetic energy recovery system”. When riding a bicycle the great amount of kinetic energy is lost while a braking. To use this energy we are using a flywheel to store the energy which is normally lost during braking and reuse it to help propel the rider when a starting. By designing the flywheel which is more suitable to the frame properties and rider compatibility the efforts of the rider can be reduced.

5.6 Praveen, m. arun ,(Dec 2014), “Kinetic Energy Recovery System in Bicycle” Kinetic Energy Recovery System (KERS) is a system for recovering the moving vehicle's kinetic energy under braking and also to convert the usual loss in kinetic energy into gain in kinetic energy. When riding a bicycle, a great amount of kinetic energy is lost while braking, making start up fairly strenuous. Here we used mechanical kinetic energy recovery system by means of a flywheel to store the energy which is normally lost during braking, and reuse it to help propel the rider when starting. The rider can charge the flywheel when slowing or descending a hill and boost the bike when accelerating or climbing a hill. The flywheel increases maximum acceleration and nets 10% pedal energy savings during a ride where speeds are between 12.5 and 15 mph.

VI. FUTURE SCOPE
This study aim to charging electric vehicles battery while travelling in remote place and it can be expanded by increasing the magnets and coils in quantity and reducing the space in between the disks on which magnets and coils are placed, by this maximum line of force is cut by the coil and flux fill generate more and induced voltage will be maximum. Using this project on motor cycle we can charge which takes 1 to 1:30 hour to get full charge. By using this project we are going remove the disadvantage of conventional power generator which make use of dynamo as a power generator which produces friction and decrease the speed of bicycle. In this project we have overcome this friction and produces clean energy.

If higher specification system is used and thick flywheel could produce more free energy at the output. Such high end system could extend the life of setup.

VII. CONCLUSION
We can conclude that, the system arrangement generates electricity without any friction with flywheel and It can be utilized in the maximum amount. We can generate electricity within very low cost. It is beneficial for battery vehicles when they are on slope.

We have successfully designed the project and implemented on frame, the generated power is utilized to charge the mobile phones and mobile devices; we also understand the concept of electromagnetism and how to generate power by just placing the magnet and coil of equal quantity on different disks without making any contact. The voltage output taken from the assembly is totally dependent on the rpm of the wheels so voltage is fluctuating so a battery is used to provide a constant power supply to our cell phone. A battery connected to the generator assembly is continuously charged when shaft moves at 80- 90 rpm which is normal speed of bike. By this assembly battery is continuously charging.
REFERENCES

I. Johan Abrahamsson Hans Bernhoff:- "Magnetic bearings in kinetic energy storage systems for vehicular applications"


IV. V.B. Bhandari, "Design of machine Elements"
