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Design & Fabrication of Speed Breaker Mechanism for Electric Power Generation

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Abstract: *In today's world, Electricity can be considered as one of the most important need for the human being. As the lifestyle is Changing and modern lifestyle is being adopted around the world the need for electricity is increasing . So, electricity can be called as the basic necessity for a developing country. The objective of this project is to design a setup that leads to generation of electricity, by speed breakers. As the requirement of electricity is increasing day by day, we have to develop an alternative conventional source of energy to tackle the problem of energy crisis and reduce the dependency on power plants to some extent. The up and down movement of a pedal is transformed into the kinetic energy to the flywheel and supported by bearing and hence electrical power can be generated using that rotational energy. In the present paper, an experimental setup of the speed breaker mechanism is elaborated for electric power generation. In our project spring is fitted below pedal, the torque and rotating motion transmit from pedal to the shaft by chain drive mechanism. The flywheel is fitted with shaft which is directly connected to the dynamometer. Because of the rotation of shaft, the magnetic lines cuts and emf induced in dynamometer, because of these electricity is generated. The power generated is noticeably large as compared to other small scale energy resources and hence this can be successfully implement in our day to day life to generate power.*

Keywords: *speed breaker, power generation, electricity*

I. Introduction

Energy is the basic and most universal measure of all kinds of works of human beings and nature. Most people use the word energy for input to their bodies or to the machines and thus think about crude fuels and electric power [1]. Energy in the form of electricity plays a very valuable role in the life of a normal man. Electricity is one of the greatest innovation of science. In present, whole life style is dependent on electricity with the increasing population the use of electric power is also increasing. But the resources to generate electricity are restricted and this has leads to the energy crisis. As the non-renewable resources are depleting day by day , it is becoming a major problem in this world. In power generation process from conventional sources induces lot of pollution to the environment like thermal heat, waste gases, high pressured water in case of hydro-electric power plant and have the risk to extinct in next 10-20 years [2]. Due to the increasing population around the world and the limited generation of electricity , it had led to scarcity of electricity supply. During this scenario we need to generate electricity from things used in day-to-day life, hence we see the non-conventional energy resources which can light up the future.

Energy critical situation and pollution are major factors needed to be accounted for. When developing a new system which must be designed to absorb minimal power along with less or no pollution to the environment, so it is necessary to utilize renewable energy resources to a greater extent to fit the desired requirement. The concept here is one among them, concentrating on the Powering up, the electrical power is being generated, a non-conventional method, from the movement of pedal transformed into the kinetic energy to the flywheel and supported by bearing and hence electrical power can be generated using that rotational energy.

II. Design Objective

To generate electric power by using speed breaker, for this we had fabricated a model which is simple in construction and geometry. Our main objective is to make it more friction less and reduce the efforts required by the components while working. And to convert the lateral motion too the rotary motion and increase the rotational speed from primary gear to the secondary gear by using proper gear ratio as per load and torque given from the pedal.

III. Methodology

In this project, we used the following components like inclined plate, helical compression spring, chain and sprocket arrangement, shaft, flywheel and dynamometer. In this process, we kept an inclined plate at 30

degree angle. One end is kept at ground, which is fixed by L-clamp and the other end attached to the two helical compression spring and there will be one link fixed to the inclined plate. The larger sprocket is inserted or attached to the link which is fixed with inclined plate and the smaller sprocket is fixed on end the shaft and there will be chained arrangement which is linked with both the sprocket and it transmit the motion from larger sprocket to a smaller sprocket. The flywheel is kept at the center of shaft to reduce fluctuation in speed and we also used two bearings for the smooth rotation of the shaft and there will be no friction for the rotation of the shaft. At the end on one end of the shaft we connect the dynamo which converts mechanical energy into electrical energy. CAD software was used to complete the modeling of the setup. Here, CATIA V5 R20 were used to fulfill the purpose.

IV. Description Of Components

The following are the main components which will transfer the lateral motion to the rotary motion of speed breaker mechanism as shown in fig. 1 and its description is given below:

a) ***Plate:*** Plate is made of cast iron. In this mechanism we using the rectangular shaped plate which is act as a speed breaker were the one end of this plate fixed and other end is mounted on spring.

b) ***Fixture:*** It is work holding device, used to support the inclined plate and fix at ground position.

c) ***Sprocket:*** We using two sprocket one is driver and another one is driven sprocket, which connected by chain to each other. One sprocket is connected to the plate by using sprocket link and another one is coupled with shaft which is connected to the flywheel.

d) ***Flywheel:*** A flywheel is mechanical device specifically designed to efficiently store rotational energy. It resist changes in rotational speed by their moment of inertia.

e) ***Spring:*** The spring is design as per the vehicles load and it will regain in original length after releasing the load of the vehicles. The two spring is connected to the opposite end of pioted point of the plate. Two helical compression spring is used in these project.

f) ***Dynamo:*** It is a device which convert mechanical energy into electrical energy. The dynamo is made up stationary magnet which create a powerful magnetic field, and a rotating magnet (rotor) which distorts and cut through the magnetic lines of flux of the stator. When rotor cuts through line of magnetic flux it makes electricity.

V. Working

In this project when moving vehicle passes over from this speed breaker due to the weight of the vehicle, inclined plate moves in downward direction and also helical compression spring get compressed to a certain level and as the larger sprocket to smaller sprocket get an initial thrust or torque, it causes the chain to rotate in clockwise direction and it transmit the motion or power from larger sprocket to the smaller sprocket due to which shaft and flywheel start rotating .We had used flywheel in this system to reduce fluctuation of speed. In this project we had also used deep groove ball bearing for the smooth rotation of shaft for the friction to be minimum. At the end of this process dynamo convert rotational energy of shaft into electrical energy which is used to lightning the bulb.

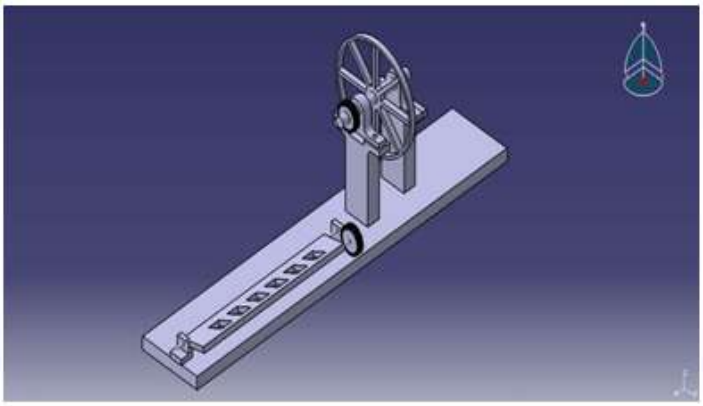

Fig.1 CAD model Speed Breaker Mechanism

VI. Conclusion

This method has many benefits such as power generation but it does not demand any fuel input. Also speed breaker makes an effective utilization of unused renewable energy source, therefore it is very useful in the present scenario of energy crisis. There are also some disadvantages such as moving mechanical parts are more and therefore there are very large frictional losses. Initial cost of this arrangement is very high but running cost is comparatively less and the overall efficiency is quite low as compared to other techniques.

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