



Research Article

PRODUCE ELECTRICITY BY THE USE OF SPEED BREAKERS

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ABSTRACT

Electricity in India? Is a big problem which is faced by people who resides in the country. Generating electricity by speed breakers is innovative and useful concept. Electricity is the form of energy, Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Many cities and towns were built alongside water falls that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, we use kerosene lamps, and rooms were warmed by wood-burning or coal-burning stoves. Direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines. Electricity generation was first developed in the 1800's using Faradays dynamo generator. Almost 200 years later we are still using the same basic principles to generate electricity, only on a much larger scale.

KEYWORDS: dc: direct current, ac: alternating current, generation, dynamo, transmission

INTRODUCTION

Next time on the roads, don't scoff at the speed-breakers. They could actually light up small villages off the highway. The rotor (rotating shaft) is directly connected to the prime mover and rotates as the prime mover turns. The rotor contains a magnet that, when turned, produces a moving or rotating magnetic field. The rotor is surrounded by a stationary casing called the stator, which contains the wound copper coils or windings. When the moving magnetic field passes by these windings, electricity is produced in them. By controlling the speed at which the rotor is turned, a steady flow of electricity is produced in the windings. These windings are connected to the electricity network via transmission lines. IIT Guwahati has evaluated the machine and recommended it to the Assam ministry of power for large scale funding. IIT design department says it is a 'very viable proposition' to harness thousands of mega watts of electricity untapped across the country every day. [7] A vehicle weighing 1,000 kg going up a height of 10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute. The figure will be huge at the end of the day.

A storage module like an inverter will have to be fitted to each such rumble strip to store this electricity. The cost of electricity generation and

storage per mega watt from speed-breakers will be nearly Rs 1 crore as opposed to about Rs 8 crore in thermal or hydro power stations.

The functioning will be as follows:

1. The speed breaker on a busy road will be lifted to some height from one side and fixed to the road from other side.
2. Then there will be a shock absorber kind of mechanism beneath the speedbreaker. The arrangement will be as in a cam and shaft arrangement.
3. The shaft of the generator placed below will be attached to the cam and the rod connected to the speed breaker vertically will be on cam. This arrangement will make one rotation of generator shaft as soon as a vehicle moves over speed breaker.
4. The rotations can also be increased using certain mechanism, like gears and all.
5. Then there will be a circuit storing the electricity generated during day time and the power generated will be used during night.

According to concept it is known as "reciprocating bump". The speed breaker designed is supported on springs. When a vehicle mounts the speed breaker, the load on the springs causes movement which is converted to a rotary motion by using a rack and pinion mechanism. The energy is generated and can be stored in batteries. The input for producing energy is the weight of the vehicle.[2]

Working diagram

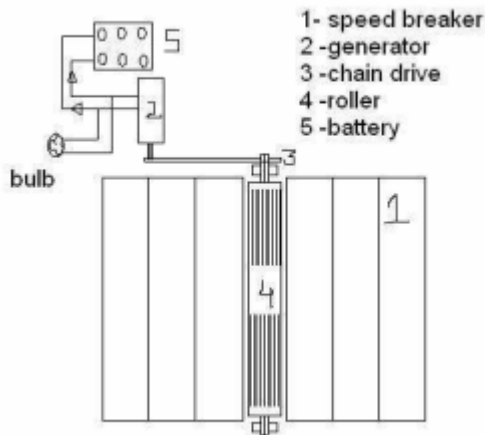


Fig-I Top view



Fig-II Side view



Fig-III

Now the question arises why only the speed breaker is used and not the rough road or plane road where the kinetic energy of the vehicle is more than what is getting on the speed breaker for answer to this question let look on one example: A car or any heavy vehicle is coming with a speed of 100 mph on the road and passing over this roller which is fitted at the level of the road then this roller is gaining the speed nearly somewhere 90 mph (due to losses). So now suppose a cycle is coming with a speed of 20 mph and is going to pass this roller (which is moving at a speed of 90 mph) due to this difference in the speed there will be a collision that is the main reason for using this concept on the speed breaker.[1]

Producing electricity from a speed breaker is a new concept that is under going research. The number of vehicles on road is increasing rapidly and if we convert some of the kinetic energy of these vehicle into the rotational motion of roller then we can produce considerable amount of electricity, this is the main concept. In this project, a roller is fitted in between a speed breaker and some kind of a grip is provided on the speed breaker so that when a vehicle passes over speed breaker it rotates the roller. This movement of roller is used to rotate the shaft of D.C. generator by the help of chain drive which is there to provide 1:5 speed ratio. As the shaft of D.C. generator rotates, it produces electricity. This electricity is stored in a battery. Then the output of the battery is used to lighten the street lamps on the road. Now during daytime we don't need electricity for lightening the street lamps so we are using a control switch which is manually operated .The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

EQUIPMENT USED:

1. Rack And Pinion Gears

The rack and pinion is used to convert between rotary and linear motion. The rack is the flat, toothed part, the pinion is the gear. Rack and pinion can convert from rotary to linear or from linear to rotary.[3][4]

2. Ball bearings

A roller-element bearing is a bearing which carries a load by placing round elements between the two pieces. The relative motion of the pieces causes the round elements to roll (tumble) with little sliding.[3]Fig-III

3. Springs

A spring is a flexible elastic object used to store mechanical energy. Springs are usually made out of hardened steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication. Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance and beryllium copper for springs carrying electrical current (because of its low electrical resistance).[3][4]

4. Dynamo

The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into

a pulsing direct electric current through Faraday's law. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turn within that field. On small machines the constant magnetic field may be provided by one or more permanent magnets; larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils.

5. Speed Breakers

Speed breakers are used to slow down the speed of vehicle by offering a resistance on wheels. It is in strips in two to five number lying parallel to each other on the road. It can be easily seen on railway crossings.[5]

CONCLUSION AND FUTURE ASPECTS

In the coming days, as demand of electricity is increasing every moment, it will prove a great boon to the world, since it will save a lot of electricity of power plants which are wasted in illuminating the street light. Future aim of this research is to develop our country by enriching it in utilizing its sources in more useful manner. Any country can only develop when it uses power supply frequently and not by getting breakdown in middle course of time. Now times comes when these types of innovative ideas should be brought into practice. Atleast, by this idea we should start to think something about to save electricity.

This project can also be modified by using camshaft and pulley system instead of gears which we have used in our project which will reduce the complexities and difficulties faced during the project.

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