



ECO FRIENDLY POWER GENERATION THROUGH SPEED BREAKER

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Abstract: As we know that generation of electricity is very costly day by day due to less amount of sources available for generation. So we tried to find the new way of generation of electricity. We go for the renewable sources for energy generation of electricity. Now in this paper we are going to explain how power can be generated by the commonly used speed breaker at malls, tool booth and government office etc... Electricity can be generated by replacing the traditional speed breaker with some simple mechanism. In this paper we described different method or mechanism for power generation through speed breaker. Among them we used spring coil mechanism for power generation. When vehicle pass over the speed breakers, they create force on spring coil which are connected to the piston crank assembly through which water in the tank get pressurized and passed to the turbine to generate electricity equivalent to the force. We can utilize this electricity to operate domestic appliances.

Key Words: Power Generation, Spring Coil Mechanism, Piston, Water Tank, Turbine, Generator & Battery Inverters

INTRODUCTION

An innovative and useful concept of Generating Electricity from a Speed breaker's our step to improve the situation of electricity. Producing electricity from a speed breaker is a new concept that is undergoing research. The number of vehicles on road is increasing rapidly and if we convert some of the Potential energy of these vehicle into the rotational motion of generator then we can produce considerable amount of electricity, this is the main concept of this paper. The benefits from this idea will be to generate electricity for the streetlights, hoardings and then for other use. Generally when vehicle is in motion it produces various forms of energy like, kinetic energy, heat energy & potential energy. We can say that all this energy that we can't make use of is just the WASTAGE OF ENERGY that is abundantly available around us. In this project we are just trying to make use of such energy in order to generate an ELECTRICAL ENERGY. This project will work on the principle of "POTENTIAL ENERGY TO ELECTRICAL ENERGY CONVERSION".

METHODS

There are different methods for power generation through speed breaker which are as follow:

1. Rack and pinion mechanism.
2. Crank shaft mechanism.
3. Roller mechanism.

4. Spring coil mechanism.

Spring coil mechanism

In this mechanism spring coil is used for creating the pressure equivalent to the vehicle's weight. We design the spring coil mechanism such that whenever a vehicle approaches the speed breaker it creates force on spring coil mechanism. Maximum load on the speed breaker is when the vehicle is on the middle of the speed breaker. Due to this force is applied on the piston/spring mechanism in the water tank/air tank. And then water/air is coming outside of the tank. This water/air is passing on rotor blade which rotates & one chain belt is there so Generator is also rotates with rotor. This generator generates electricity which can be used for lighting of the lamps on the road or it may be stored in the battery and can be converted in AC current using inverter and used for lighting of the lamps, signals sign boards on the road.

Material

There are different components used for power generation through speed breaker using spring coil mechanism.

1. Spring coil arrangement.
2. Water tank.
3. Turbine & Generator.
4. Battery & Inverter.
5. Light bulb as street light.

Spring coil arrangement

The function of spring is to bear a load and twist by application of force from the speed breaker. The spring should be such that it can generate enough force to pressurize the water in tank by piston. Based on this requirement stainless steel material is selected for spring. The spring stiffness and spring deflection for chosen spring are 17500 N/m and 0.01M. There are different types of spring according to their shape like helical spring, torsion, conical and volute spring and leaf spring.

Turbine & Generator

A pelton turbine consists of a set of buckets or cups mounted on a hub. This wheel is mounted on the generator shaft.

For this model a permanent magnet DC generator with drum type armature, wave winding is suitable which is shown in fig

Battery & Inverter

The battery used in the project work is rated for 7AH at 12V.

Inverter circuit is made using the timer IC555 and power transistor. Timer IC is working in astable mode, so it will used to generate frequency. The frequency is controlled by variable resistor and capacitor. The power transistor used to get high power output.

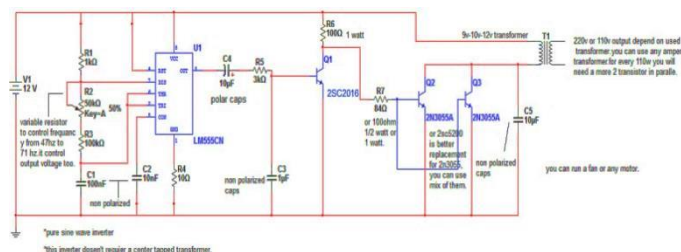


FIGURE 1: INVERTER CIRCUIT

WORKING

There's a spring and tank arrangement below the speed breaker. This arrangement is kept into the tank arrangement which is filled with the water. One outlet pipe is exerted from the bottom of the tank. This outlet is rested beyond the turbine arrangement. This turbine is mechanically and electrically coupled with generator. Battery is kept there to store the power generated by the generator as in dc form. To utilize it into ac form, inverter is placed across the battery. Whenever the any weighted vehicle passes over the speed breaker, it moves downward. As speed breaker goes downward. Spring gets compression force. Now piston goes downward on the water tank, it creates the pressure into the water. Now this water tries to come out of the tank due to pressure. We have valve arrangement in the outlet tube. As we open the valve, the pressurized water tries to exert from the tank by full forced. As

Pressurized water exert from the outlet, it falls down on the turbine wings/cups. So the turbine gets rotating with full speed. Turbine is coupled to the generator mechanically and electrically. Hence, by this input from turbine to generator, generator generates the power in dc form.

This generated dc power is stored in the battery. To use the power in ac form, inverter is placed out there. By this we are ready to use this power at any light loads such as street lights, barricades and other electrical stuffs/equipment's.

RESULT

Vehicle load (Kg)	Max.Voltage generated (volts)
50	5
100	8.83
150	12.05
200	14.91

TABEL 1: Vehicleload v/s Voltage generation

Application

Power generation using speed breaker system can be used in most of the places such as:

- This mechanism can be used in all highways.
- This mechanism can be used in all state and national highways.
- This mechanism of generating of electricity can be placed on the actual speed breaker of the roads.
- The power is generated when the vehicles pass through it. Which in can be stored in the battery.
- This power can be used in many places after using the inverter, which enhances in the voltage from 12 volts to 230 volts.

Future scopes

- The shortage of light can be reduced at some extant.
- Wastage of energy of vehicles passing on roads can be minimized.
- Such speed breakers can be designed for heavy vehicles, thus increasing input weight and ultimately increasing output of generator.
- More suitable and compact mechanisms to enhance efficiency.

Unique feature

- This model is totally based on new concept as up till now only mechanism of spring is used for hydraulic oil and air pressure method.
- We first time use water for generation through speed breaker.
- Also there is water recycling process in this project so the water used can be used further again and again. Also there is natural flow of water.

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