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ELECTRIC POWER GENERATION BY SPEED BREAKER

Swapnil Daphal
Student, Department of Mechanical Sandwich Engineering
Indira College Of Engineering And Management Pune,India

Abstract -Energy is the primary need for survival of all organisms in the universe. Everything what happens in the surrounding is the expression of flow of energy in one of the forms. But in this fast moving world, population is increasing day by day and the conventional energy sources are lessening. The extensive usage of energy has resulted in an energy crisis over the few years. Therefore to overcome this problem we need to implement the techniques of optimal utilization of conventional sources for conservation of energy. This project includes how to utilize the energy which is wasted when the vehicles passes over a speed breaker. Lots of energy is generated when vehicle passes over it. There are four mechanisms to generate electricity through speed breakers viz., Rack & Pinion mechanism, Crank Shaft mechanism, Roller mechanism and Spring Coal mechanism. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy of the shaft through rack and pinion mechanism or some other mechanism. Then, this mechanical energy will be converted to electrical energy using generator which will be saved with the use of a battery.

I. INTRODUCTION

During last few years, electrical energy is the basic requirement of human beings. The ratio of electricity requirement is increasing day by day. But we know that the resources for power generation are limited, and this has caused the energy crisis. The increasing power demand time to think about non-conventional energy resources or renewable energy resources which are eco-friendly to the environment. In order to minimize the emission of greenhouse gases, renewable energy technologies are widely used for electricity generation. Solar and wind technologies are frequently used for electricity generation. Fig 1 shows power generation in India by each sector.

The availability of regular conventional fossil fuels will be the main sources for power generation, but there is fear that they will get exhausted. Therefore we have to investigate new sources for power generation. Another major problem today is pollution which has impact on all living organism, land air water.

Therefore we have to investigate pollution free and renewable resources, which produce electricity without any commercial fossil fuel.

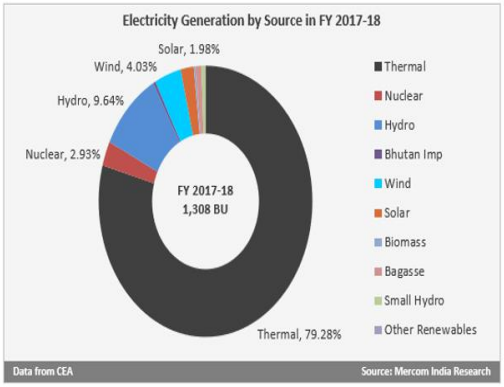

Fig1. Power generation in India

II. BASIC PRINCIPLE

Electricity can be generated with the help of speed breaker by making gear arrangement and using electronic gadgets, thus a huge amount of electricity can be generated saving lot of money. We can develop electricity from speed breakers by using 3 Mechanisms basically they are as follows:

1) Roller mechanism
2) Crank-shaft mechanism
3) Rack-pinion mechanism Since Rack-pinion mechanism is convenient to produce ample amount of energy with maximum efficiency, we have chosen this method for our project with a very simple and effective design for generating electricity using a generator.

The project is concerned with generation of electricity from speed breakers-like set up. The load acted upon the speed breaker setup is there by transmitted to rack and pinion arrangements. Here the reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement. The axis of the pinion is coupled with a gear. This gear is meshed a pinion. As the power is transmitted from the gear to the pinion, the speed that is available at the gear is relatively multiplied at the rotation of the pinion which is coupled to gear arrangement.

III. ROLLER MECHANISM

In this Mechanism, 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 different speed ratios. 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.

In this project the ramps has been replaced with the specially designed rollers which directly absorbs the kinetic energy of the moving vehicles and converts them to rotational energy and thereby rotating the generator, to produce the electrical power.

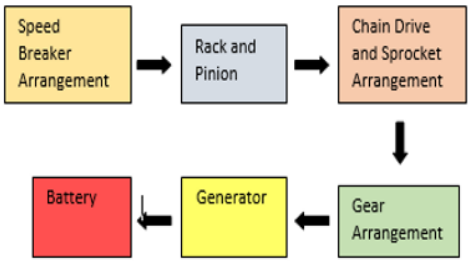

Fig2. Block diagram of setup

IV.DISADVANTAGES

Maintenance will be very difficult Might cause collision

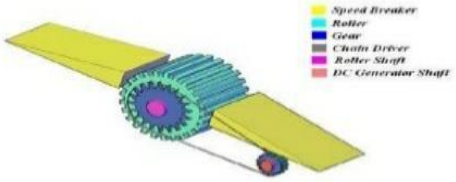

Fig3. Overall design layout

Table1: Vehicle load corresponding voltage and current

Load (Kg)	Voltage(Volts)	Current(Amps)
135	2.3	0.1
205	3.1	0.22
270	4.08	0.31
300	5.5	0.42
440	7.2	0.6
600	8.6	0.74

V.WORKING OF RACK-PINION MECHANISM

While moving, the vehicles possess some potential energy due to its weight and it is being wasted. This kinetic energy can be utilized to produce power by using a special arrangement called power hump. It is an electro-mechanical unit. It utilizes both mechanical technologies and electrical techniques for the power generation and its storage. Power hump is a dome like device likely to be speed breaker.

Whenever the vehicle is allowed to pass over the dome it gets pressed downwards then the springs are attached to the dome and are compressed and The rack which is attached to the bottom of the dome moves downward in reciprocating motion of rack into rotary motion of gears but the two gears rotate in opposite direction.. So that the shafts will rotate with certain r.p.m. These shafts are connected through a set of gears to the dynamos, which converts the mechanical energy into electrical energy.

The conversion will be proportional to traffic density. The electrical output can be improved by arranging these power humps in series. This generated power can be amplified and stored by using different electrical devices. The project is concerned with generation of electricity from speed breakers like set up. Here the reciprocating motion of the speed breaker is converted into rotary motion using the rack and pinion arrangement. The axis of the pinion is coupled with a gear. This gear is meshed a pinion.

As the power is transmitted from the gear to the pinion, the speed that is available at the gear is relatively multiplied at the rotation of the pinion. The axis of the pinion is coupled to a gear arrangement. Here we have two gears with different diameters. The gear (larger dimension) is coupled to the axis of the pinion. Hence the speed that has been multiplied at the smaller sprocket wheel is passed on to this gear of larger dimension. The pinion is meshed to the gear. So as the gear rotates at the multiplied speed of the pinion, the pinion following the gear still multiplies the speed to more intensity.

Hence although the speed due to the rotary motion achieved at the first gear is less, as the power is transmitted to gears the speed is multiplied to a higher speed. The rotor which rotates within a static magnetic stator cuts the magnetic flux surrounding it, thus producing the electric motive force (emf). This generated emf is then sent to a bridge rectifier, where the generated ac current is converted to dc. This regulated emf is now sent to the lead-acid battery.

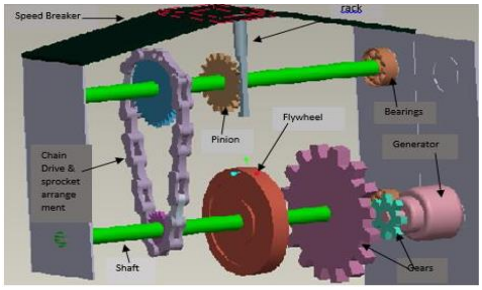

Fig4. Schematic diagram

A. Methodology

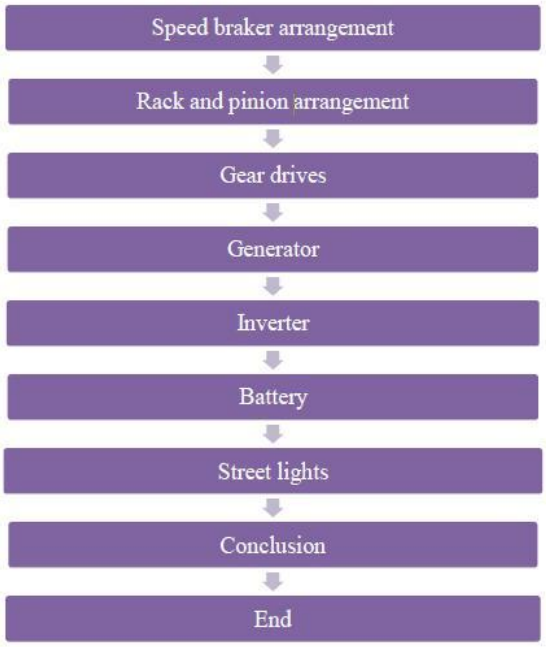

Fig .5 Flow chart

VII. ADVANTAGE OF USING SPEED BREAKER AS POWER GENERATOR

1. Require simple construction methods.
2. Free from all types of pollutions.
3. It is economical and easy to install.
4. Maintenance cost is low.
5. No consumption of fossil fuel which is nonrenewable.
6. No manual work necessary during generation.
7. Energy available all year round.

VIII. CONCLUSION

It is a non-conventional type of producing the energy. The existing source of energy such as coal, oil etc. may not be adequate to meet the ever increasing energy demands. These conventional sources of energy are also depleting and may be exhausted at the end of the century or beginning of the next century. Consequently sincere and untiring efforts shall have to be made by engineers in exploring the possibilities of harnessing energy from several non-conventional energy sources. This project is a one step to path of that way. The overall goal was to design the speed breaker System while keeping the engineering, producer and customer models in check. The reason why this feature was used more than all of the other features are because the other features would not have as much effect on the complete system. By changing the size and desirable price, weight and capacity can be realized. We used a survey to find out how the price, weight and capacity were scaled. Much was learned on how to and not to conduct a survey.

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