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Power Generation by Speed Breaker

Swapnil K. Jari[1], Vivek N. Gawai[2], Gajanan S. Junghare[3], Prof. Mandar V. Pathak[4]
[1,2,3]BE, Electrical Engineering Department, DES'sCOET, Maharashtra, India
[4]Assistant Professor, Electrical Engineering Department, DES'sCOET, Maharashtra, India

Abstract : ***Todays date power becomes essential need for human routine. Due to consistent increase in population and reduction of the conventional sources and hence it becomes vital that we must think on non-conventional sources for power generation. While travelling, the vehicles posses some kinetic energy and it is being wasted. This kinetic energy can be utilize for production of power by using a special arrangement called "POWER HUMP". The Kinetic energy of travelling vehicles can be converted into mechanical energy of the shaft through rack and pinion mechanism. This shaft is connected to the electric dynamo and it produces electrical energy proportional to traffic density. This generated power can be regulated by using Zener diode for continuous supply. All this mechanism can be housed under the dome like speed breaker, which is called hump. The generated power can be used for general purpose like streetlights, traffic signals. The electrical output can be improved by arranging these power humps in series this generated power can be amplified and stored by using different electric devices. The maintenance cost of hump is almost nullified. By adopting this arrangement, we can satisfy the future demands to some extent.***
Key Words: Electromotive force, Generator, Non-conventional energy, Speed breaker.

I. INTRODUCTION

In the present day scenario power has become the major need for human life. Energy is an important input in all the sectors of any countries economy. The day-to-day increasing population and decreasing conventional sources for power generation, provides a need to think on non-conventional energy resources. Here in this paper we are looking forward to conserve the kinetic energy that gone wasted, while vehicles move. The number of vehicles passing over speed breaker on road is increasing day by day. Beneath speed breaker, setting up an electro-mechanical unit known to be power hump, could help us conserving this energy and use it for power generation. The electrical output can be improved by arranging these power humps in series. This generated power can be stored, by using different electrical devices. We can supply this energy to street lights, traffic lights, and nearby areas, and thus helps in country"s economy. We could make it more efficient, by also having a solar panels that provides for power needs while the vehicles were not moving.

II. BASIC PRINCIPLE

While moving, the vehicles possess some kinetic energy 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 is compressed and the rack which is attached to the bottom of the dome moves downward in reciprocating motion. Since the rack has teeth connected to gears, there exists conversion of reciprocating motion of rack into rotary motion of gears but the two gears rotate in opposite direction.
A flywheel is mounted on the shaft whose function is to regulate the fluctuation in the energy and to make the energy uniform. So that the shafts will rotate with certain R.P.M. these shafts are connected through a belt drive to the dynamos, which converts the mechanical energy into electrical energy. The conversion will be proportional to traffic density.



Whenever an armature rotates between the magnetic fields of south and north poles, an E.M.F is induced in it. So, for inducing the E.M.F. armature coil has to rotate, for rotating this armature it is connected to a long shaft. By rotating same e.m.f is induced, for this rotation kinetic energy of moving vehicles is utilized. The power is generated in both the directions; to convert this power into one way, a special

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component is used called zener diode for continuous supply. All this mechanism can be housed under the dome, like speed breaker, which is called HUMP. 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.

A. Possible using different mechanisms

Spring coil mechanism
Rack- Pinion mechanism
Crank-shaft mechanism
Roller mechanism

B. Rack and pinion mechanism

Speed breaker POWER GENERATOR Converters basically new concept of non-conventional energy generation. It is electro-mechanical energy generating machine. This machine converts reciprocating motion in to rotary motion. The rotational power is stored in flywheel & flywheel rotates dynamo, which generates electricity.

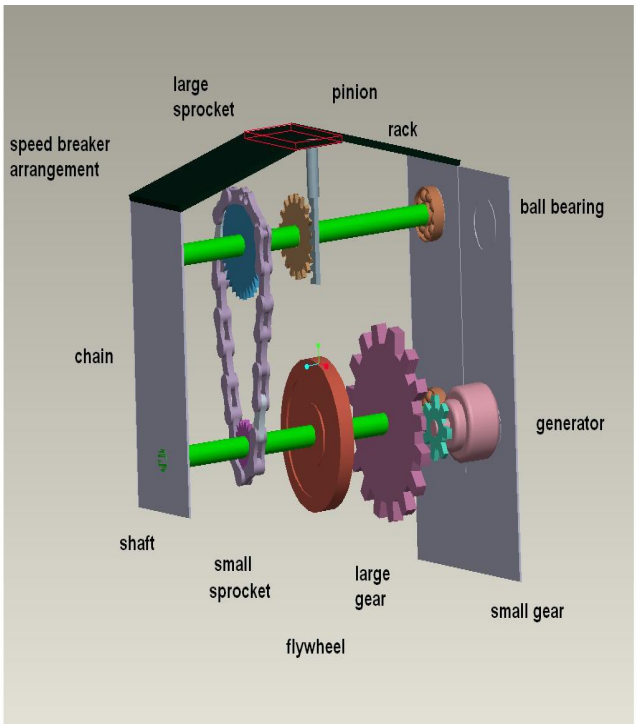


Fig. 1: Rack And Pinion Mechanism

Here first important point is how we get reciprocating motion, which is prime input in the system. For that we use weight of Moving vehicle on the Speed breaker. We put our machine underneath the Sped breaker installing different units. All the units are connected to the common shaft using chain and sprocket drive.

The head of rack is brought up to level beneath the speed breaker surface. When vehicle moves on the speed breaker, the rack it will be pushed down. The rack is attached with free wheel type pinion that rotates in one direction only. The rack & pinion arrangement convert reciprocating motion in to rotary motion.

This rotary motion is further magnified using reciprocating motion in to rotary motion-belt & pulley drive. The output of pulley is attached with flywheel which stores kinetic energy and transfer to dynamo which generate electricity with zero cost. A "generator" and "motor" is essentially the same thing: what you call it depends on whether electricity is going into the unit or coming out of it. A generator produces electricity. In a generator, something causes the shaft and armature to spin. This generated power is used for various application required by different user.

C. Block Diagram

The below fig.2 shows the different component used in the system as shown below:

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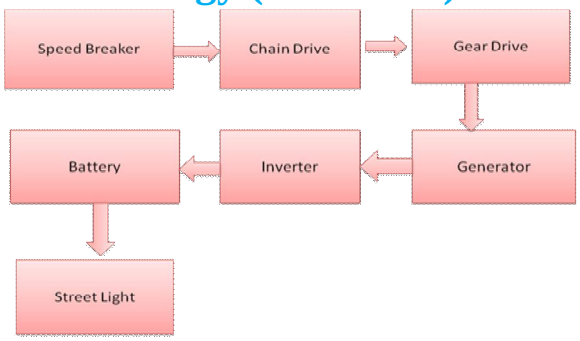


Fig. 1: Block Diagram

III. WORKING

This Paper explains the mechanism of electricity generation from speed breakers. The vehicle load acted upon the speed breaker system is transmitted to rack and pinion arrangements. Then, reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement where the axis of the pinion is coupled with the sprocket arrangement. The sprocket arrangement is made of two sprockets. One of the sprockets is larger in dimension than the other sprocket. Both the sprockets are connected with chain which transmits the power from the larger sprocket to the smaller sprocket. As the power is transmitted from the larger sprocket to the smaller sprocket, the speed that is available at the larger sprocket is relatively multiplied at the rotation of the smaller sprocket. The axis of the smaller sprocket is coupled to a gear arrangement. Here we have two gears with different dimensions.

The gear wheel with the larger diameter is coupled to the axis of the smaller sprocket. Hence, the speed that has been increased at the smaller sprocket wheel is passed on to this gear wheel of larger diameter. The smaller gear is coupled to the larger gear. Therefore, as the larger gear rotates it increases the speed of the smaller gear which is following the larger gear and multiplies the speed to more intensity. Though the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, the final speed achieved is high. This speed is sufficient to rotate the rotor of a generator and is fed into the rotor of a generator. 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 an inverter, where the generated emf is regulated. This regulated emf is now sent to the storage battery where it is stored during the day time and can be used in night time for providing power to street lights.

IV. ADVANTAGES

Economical and easy to install.
It is eco-friendly.
Maintenance cost is low.
Will solve some of the electricity problems of the world.
This can be implemented on heavy traffic roads and toll booths and can be used to power the street lights.
It can be a solution the electricity shortage in most villages.

V. CONCLUSION

It can be implemented at any roads sub ways.
Depending upon the traffic electricity generated.
Construction and arrangement is very easy for installation..
The stored or generated electricity could satisfy the daily requirement of electric power of respective area.

VI. FUTURE SCOPE

It has easy and reliable use for parking at multiplexes, malls, toll booths, signals, etc.
Uses: Charging batteries and using them to light up the streets, etc.
Such speed breakers can be designed for heavy vehicles, thus increasing input torque and ultimately output of generator.
More suitable and compact mechanisms to enhance efficiency.

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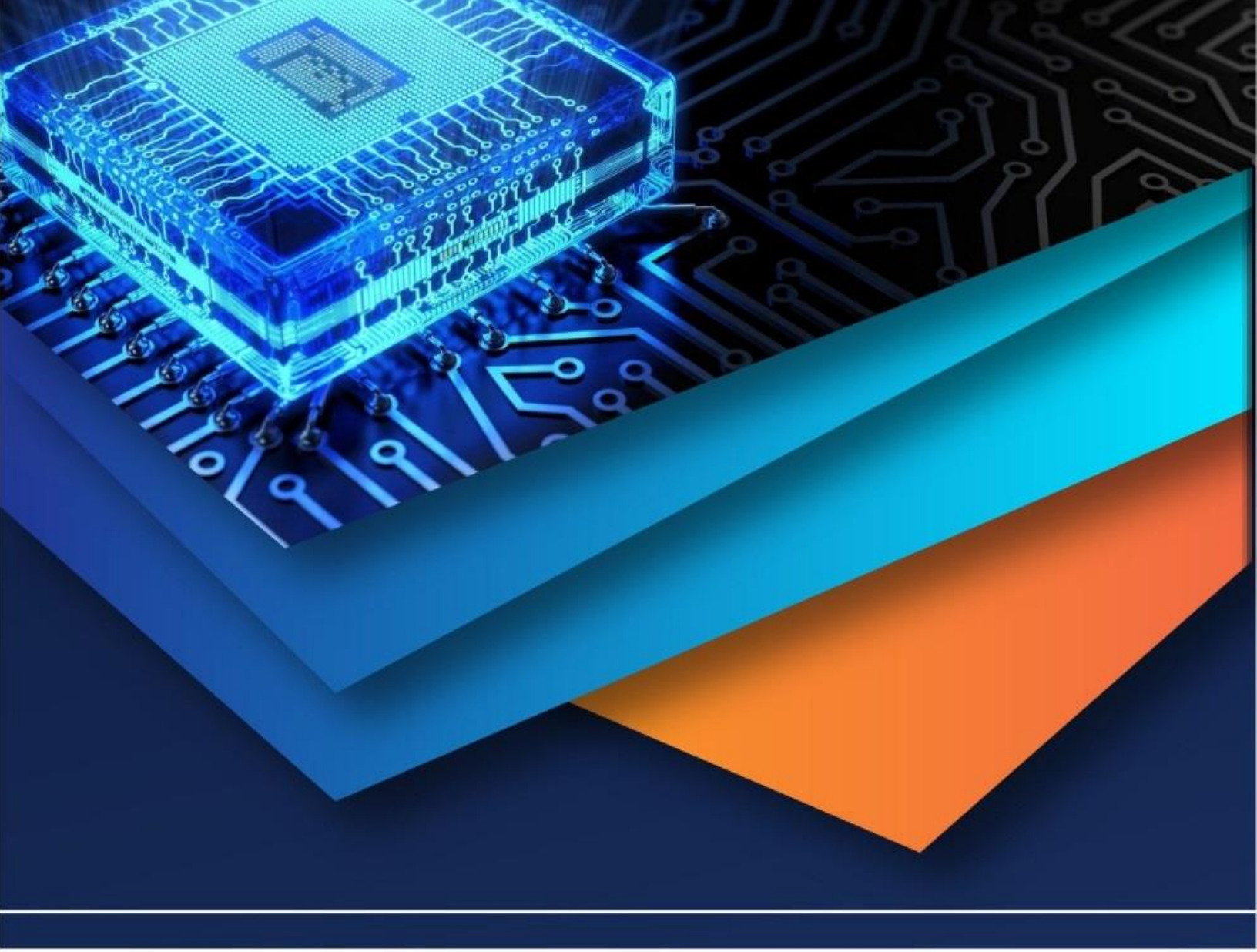
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