

Generation of Electricity through Road Breakers (By Rack Pinion Mechanism)

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Abstract- In this research Electricity is generated by replacing the traditional speed breakers with some simple mechanism. As vehicles pass over the speed breakers, they spin the rollers which are connected to a generator which in turn generate electricity. This method is an effective way to produce electricity as the numbers of vehicles on the road are ever increasing. Also, the cost of fabrication of the model is low. It can be effectively placed near traffic lights, at the entrance of parking lots and any other place where the traffic density is high. Rollers are fixed on a wooden ramp on which vehicle passes. As vehicle passes over it, it starts moving. A chain drive mechanism is provided which transfer the motion to a DC motor/generator for electricity generation. This method provides an efficient way to generate electricity from the kinetic energy of moving vehicles in roads, highways, parking lots etc.

Key words- Breakers, Electricity, Electric breakers, Energy conservation, Rack-pinion gears, Ball Bearing, Fly Wheel, Spur Gear, Shaft

INTRODUCTION

During last few decades, 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 results reduce in conventional resources for

power generation and increase the pollutants emissions. It is a need of 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.

Speed breakers are used to slow down traffic near schools, hospitals so that children can cross the road more easily or senior citizens can cross at ease. They are also placed near toll booths and entry points of bridges or narrow roads, to ensure that motorists reduce their speed.

The experimental work here aims to investigate the generation of electricity through rack pinion method. There was a noteworthy change in speed breaker age unit. The change was utilizing rack and pinion system in which the responding movement of the speed-breaker is changed over into revolving movement. In this instrument, the best piece of the rack is associated with the speed breaker and the lower part is connected with pinion. As the vehicle ignores the speed breaker the rack moves the descending way which thus turns the pinion clockwise way. The pivot of the pinion is combined with the sprocket plan on the poles. The sprocket course of action is made of two sprockets. One of bigger size and the other of littler size. Both the sprockets are associated by methods for a chain which serves in transmitting power from the bigger sprocket to the littler sprocket. As the powers transmitted from the bigger sprocket to the littler sprocket, the speed that is accessible at the bigger sprocket is moderately

duplicated at the turn of the littler sprocket. As the littler sprocket pivots the pole pivots which thus turns the pole of DC engine through apparatus gathering. Likewise, a flywheel is associated on the pole of the littler sprocket in order to get persistent revolution of the pole and in this manner the generator. Therefore, power is delivered when pinion is pivots clockwise way however what happens when the rack moves upward way? In this way the pinion will turn anticlockwise way and wipe out the development of clockwise bearing accordingly diminishing the effectiveness of the general framework. Consequently because of this real disadvantage even rack and pinion component have its own impediments.

Rack and pinions are a kind of straight actuator that includes a couple of riggings which change over rotational movement into direct movement. A roundabout rigging called "the pinion" connects with teeth on a straight "apparatus" bar called "the rack"; rotational movement connected to the pinion makes the rack move, accordingly interpreting the rotational movement of the pinion into the direct movement of the rack.

FUNCTIONS

1. Rack-pinion gears
2. Ball Bearing
3. Fly Wheel
4. Spur Gear
5. Shafts

1. Rack-Pinion Gears:

A rack and pinion gears system is composed of two gears. The normal round gear is the pinion gear and the straight or flat gear is the rack. The rack has teeth cut into it and they mesh with the teeth of the pinion gear. Rack and pinion gears are available in three variations:

- Straight teeth
- Helical teeth
- Roller pinion

2. Ball Bearing:

- The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. In most applications, one race is stationary and the other is attached to the rotating assembly.

3. Fly Wheel:

- Fly wheel used to provide continuous energy when the energy source is discontinuous.

4. Spur Gear:

Spur gears are the most common type of gears. They have straight teeth, and are mounted on parallel shafts. Sometimes, many spur gears are used at once to create very large gear reductions. Spur gears are used in many devices' electric screwdriver, dancing monster, oscillating sprinkler, windup alarm clock, washing machine and clothes dryer.

5 Shafts:

It is a rotating element, which is used to transmit power from one place to another place. The material used for ordinary shafts is mild steel. When high strength is required, an alloy steel such as nickel, nickel chromium or chromium-vanadium steel is used.

APPLICATIONS

These types of methods are use in all highways.

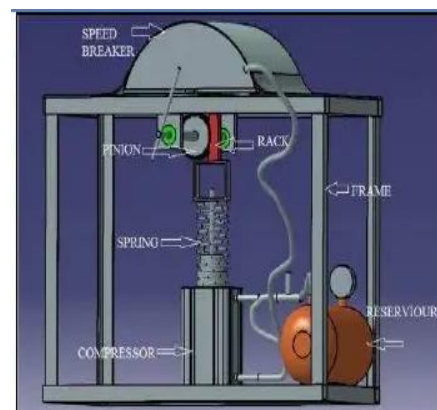
This all type's mechanism of generating power can be placed on proper place speed breaker on the road.

This generating power used many places after convert into A.C forms using through inverter.

All types of mechanisms are connected to batteries because vehicles pass through and generating power and store to batteries.

To provide electric power in small village near to highway. Use in highway street light, in toll booth.

COMPARISON



Parameter	Spring coil	Crank shaft mechanism	Air compression	Roller mechanism	Rack and pinion mechanism	Air piston mechanism
cost	Low	High	Low	cheap	Moderate	Costly
Mechanism setup	easy	Very hard	easy	Very easy	difficult	Very difficult
maintenance	More less required	Very high	Low	Less required	Weekly basis	Daily basis
Adjustable	Yes	Yes	Yes	None	Yes	Yes
Design	Very easy	Very hard	Easy	Easy	Depends upon weight	Depends upon air pistons

ADVANTAGES

- Eco-amicable: In this component no contamination is made.
- No fuel utilized: In control plants there is petroleum product is utilized i.e. coal, diesel, gas, and so on however in this system no fuel is utilized.
- Maintenance: Less support is required for this framework. The fundamental preferred standpoint of this component is there is no any rotational parts like wrench shaft system and rack and pinion instrument likewise no rigging is required. Along these lines, it requires less support.
- Operation: Operation is simple and easy to see so less.

DISADVANTAGES

- Crank shafts are required to be mounted on bearings which creates balancing problems leading to mechanical vibrations which in turn damage the bearings.
- Secondly, as bearing are of sliding types, any occurrence of variable load (which is bit obvious in case of vehicles...) leads to balancing problem.

CONCLUSION

- In this paper power was generated at speed breakers by using Spring Coil And Rack Pinion Mechanism. This type of power generation is identified to be cheaper than many other alternatives and the model has a smaller number of parts and the assembly would cost very less with all the components being available regularly and no model specific parts are to be manufactured.
- This are then found to be more cheap, economical, safe, and required less maintenance.
- This project is designed for road power generation is specifically used on highways, entrance and exit of school, college and companies. Entrance and exit of malls. It can be installed at toll booths, bus stands, airports and railways parking zone electricity generated by road power generation.

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