Application of Rack And Pinion Mechanism for Generation of Power through Road Speed Breaker

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ABSTRACT

Energy is the basic need for the development of the modern world. For meeting up the regular demand of energy we need to design a system that will produce electricity without affecting the nature. This paper attempts to show how man has been utilizing and optimizing kinetic energy. Researches show that the world has already had its enough shares of its energy resources. Fossil fuels pollute the environment. Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shifting more and more towards the renewable sources of energy, which are essentially, non-polluting. This paper attempts to show how energy can be produced, stored and used using the road transport pressure or any kind of pressure. The number of vehicles passing over the speed breaker in roads is increasing day by day. There is possibility of tapping the energy and generating power by making the speed breaker as a power generation unit.

Keywords: Power Generation, Road Speed Breaker, Pinion Mechanism, Power Hump

I. INTRODUCTION

As we know today's world facing energy crisis due to two reasons. First is increasing population of the world rapidly and the second one to increasing the standard living of human being.

In present scenario electricity becomes the major need of human life.

India is the country which majorly suffers lack of electricity generation. In India there is tremendous use of vehicle year by year. In this project we are looking forward to conserve kinetic energy or pressure energy that gone wasted, while vehicle move on the road. The number of vehicle passing over the speed breaker and increasing day by day. So that we can use the energy of vehicle through road speed breaker to generate the electricity.

(Q).Why we are using only speed breaker on rough or plane road?

Now the question is arises why only speed breaker is used on rough or plane road. Where the kinetic the

energy of the vehicle is more than that obtain on the speed breaker.

The answer of the company is as For ex. A vehicle moving with a speed of 100KM/HR on the road and passing over the roller which is fitted at the level of the road then this roller will gain the speed of 90KM/HR (due to losses). Now suppose a bicycle with a speed of 20KM/HR is going through the same roller (which is moving at the speed of 90KM/HR) just after the vehicle. Then due to this difference in the speed there will be collision in between roller speed and bicycle speed then there is chances of skidding of bicycle.

The main reason for using this concept of the speed breaker instead of rough or plane road will not provide the sufficient torque which is necessary for the energy generation.
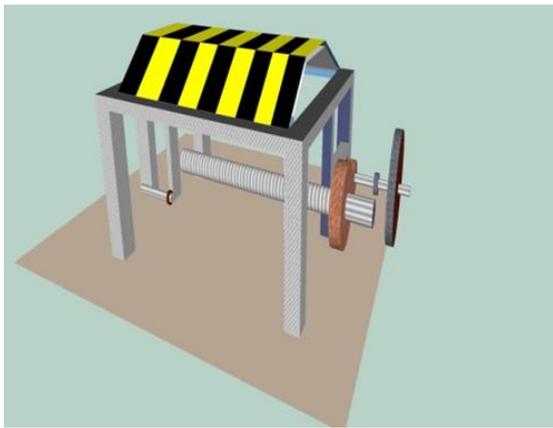
the vertical linear motion is produce by the damping arrangement of rack. This motion of rack converted into rotary motion by two parallel sprocket in opposite direction. When the rack is downward in motion one sprocket is giving the stroke and the other is ideal. In return motion the idler sprocket are giving the stroke and other one is idle.

In this arrangement we got stroke in both motion (upward and downward) the larger gear is rotating with the main shaft. The pinion which is mounted on the secondary shaft connected with the larger gear are rotating at high rpm.

The coupling and flywheel are rotating on the secondary shaft. Flywheel developed a large amount of moment of inertia. The alternator is connected with the flywheel which captured the energy of the flywheel and converted into electricity which is stored in a battery.

CONSTRUCTION

In our paper we represents the changes made from intial design of speed breaker power generation model till presented.

This paper work on rack and pinion mechanism system.

The plate is connected with damping arrangement (two arrangement parallel to each other) which are connected with sprocket through main shaft.

The larger gear mounted on the main shaft and pinion is mounted on secondary shaft (gear ratio 6.92). The pinion is connected with ratchet coupling with flywheel. 12V DC alternator is mounted on the pinion shaft. Thus electricity is generated through alternator in this mechanism.

CALCULATION

*Based on mechanical instrument

The velocity of moving vehicle 6KM/HR
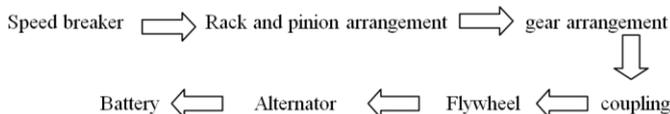The weight of load acting is 200KG

Power = work done / Time

Force=m×g

$\qquad$ =200×9.81

$\qquad$ =1962 N

Distance =10 cm=0.1 m

Distance travelled by body=Height of speed breaker

Output power(mechanical power)=workdone/sec

II. METHODS AND MATERIAL

WORKING

The electricity is produced by the speed breaker installed on the road. The breaker phase contact with the vehicle

$$=\frac{1962 \times 0.1}{60}$$

$$=3.27 \text{ W}$$

Power developed for one vehicle passing over speed breaker arrangement for one min is 3.27 W.

Power developed for 60 min= 3.27×60

$$= 196.2 \text{ W}$$

Power developed for 24 hours = 196.2×24

$$= 4708.8 \text{ W}$$
$$= 4.708 \text{ KW}$$

*Based on electrical instrument

Let,

I-Electric current in ampere

V-Voltage in volts

T-Time in second

Volt generated=1.3 V

Current Generated=3 amp

$$=1.3 \times 3$$
$$=3.9 \text{ W}$$

III. CONCLUSION

Upcoming days, it will prove a great boom to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights.

As conventional source are depleting very fast, than it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country.

Now vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for proper generation by means of a new technique called "power hump".

In future, if the flywheel speed control device and voltage protection devices are added with large generation process, it would be a model all over the world.

After some modification of the design project, the efficiency of the whole system can be increased by increasing the capacity of the generator and applying more weight.

IV. REFERENCES

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