POWER GENERATION BY MULTIPLE ROAD HUMPS

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ABSTRACT – Energy is the primary need for survival of all organisms in the organisms in the universe. Everything what happens in the surroundings 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 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 conversation of energy. This project includes how to utilize the energy which is wasted when the vehicle passes over a speed breaker. Lots of energy is wasted when vehicles passes over a speed breaker as power generating unit. The kinetic energy of the moving vehicle s can be converted into mechanical energy.

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. The generated power can be used for the lamps near the speed breakers and this will be a great boon for the rural villages too.

INTRODUCTION

In the present scenario power becomes the major need for human life. The availability and its per capita consumption are regarded as the index of national standard of living in the present day civilization. Energy is an important input in all the sectors of any countries economy. Energy crisis is due to two reasons, firstly the population of the world has been increased rapidly and secondly standard of living of human beings has increased. India is the country, which majorly suffers with lack of sufficient power generation.

The availability of regular conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to investigate some approximate, alternative, new sources for the power generation, which is not depleted by the very few years. Another major problem, which is becoming the exiting topic for today is the pollution. It suffers all the living organisms of all kinds as on the land, in aqua and in air. Power stations and automobiles are the major pollution producing places.

Therefore, we have to investigate other types of renewable sources, which produce electricity without using any commercial fossil fuels, which is not producing any harmful products. There are already is existing such systems using renewable energy such as solar wind), OTEC (ocean thermal energy conversions) etc…for power generation. The latest technology which is used to generate the power by such renewable energy" POWER HUMP".Speed breaker energy conversion, We know that in any road junction there are speed breakers been installed to create humps on the road to slow down the moving vehicles to monitor the vehicle safely and all the vehicle whether they are two or four wheelers or six wheelers they are stamping on the hump of the speed breaker putting all their inherent load on it. Considering this aspect we thought of utilizing this cushioning effect of the shock absorber of the vehicle, some part to be borrowed by the hump, to cushion the hump by at least one and half inches which will not affect the principle of the hump of the speed breaker. This hump cushioning inside by 60mm will activate the floating gear mechanism will rotate and generate the power: the output can be shown by glowing the small bulb.

2. WORKING

We are making the speed breaker humps, two numbers on which vehicles are moving, the hump are pressed down by the vehicle which will make the Chain and sprocket to roll which is held on the free wheel which is mounted on the common axle

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which drives the gears further. We have two numbers of humps and two numbers of chain and sprocket mounted on a common axle.

The Sprocket which is having the free wheel action will make the common axle to rotate the hump retracts back by the spring retention which is compressed during the compression of the hump. The retraction of the hump up will not disturb the common axle rotation since the engaged is having free wheel mechanism. The first hump pushes the rack and the rotations are effected and slowed and the second hump is pushed which continues the rotation by the common axle which is connected to the set of gear which is having the pulley to drive the generator to rotate to generate electricity which will be charging the battery.

The power generated is connected to the LED plate in which 20 led's are connected to show the power generation during rolling action and with the changeover switch being provided the LEDs plate get disconnected and the current produced flows to the battery to charge the battery. From the battery, inverter circuit is made which gives 12volts supply to glow the CFL tube light.
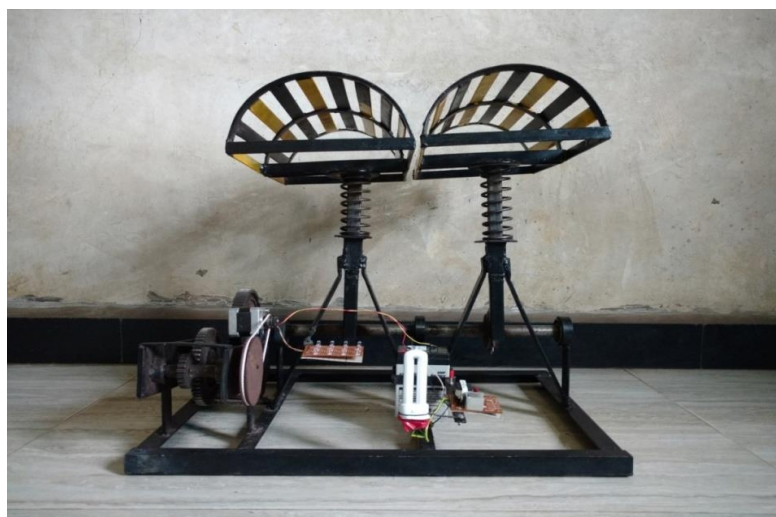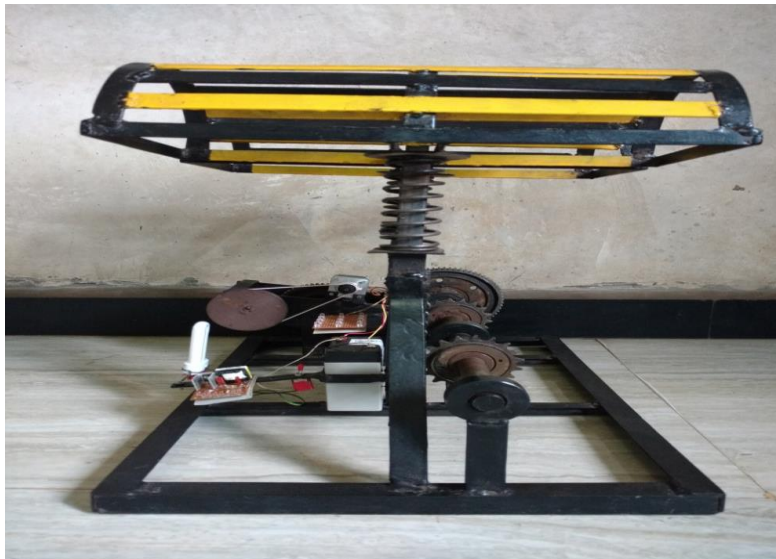
3.DESIGN CALCULATIONS

3.1DESIGN OF GEAR RATIO

Z1=68   Z2=18   first gear ratio   =3.777
Z3=44   Z4=22   second gear ratio =2
Z5=53   Z6=21   third gear ratio   =2.52

Drive pulley of diameter=80mm, driven pulley=18mm

First gear ratio   68 /18   =3.777
Second gear ratio   44 / 22   =2
Third gear ratio   53/21   =2.52
Total gear ratio   3.777 x 2 x 2.52   = 19.036
Pulley ratio   80/ 18   = 4.4

Total ratio= Total gear ratio x Pulley ratio
            = 19.036x 4.4
            = 83.75 turns

In this, rack is compressed or moved for the distance of approximately 60mm in which the chain roller pitch is 10mm which will engage with the free wheel sprocket of diameter 80mm with 18 numbers of teeth on all around the gear.

Since rack is engaging the teeth for 60mm length stroke, with 10mm pitch, so 6 number of teeth are getting engaged with the rack which is having 18number of teeth. So the first gear is rotating for
360 x 6 / 18 == 120 degree.

If the first gear or Z1 was rotating for one full turn, then the final gear rotation was for 83.75 turns. Now since it is rotating for 120 degree instead of 360 degree.

83.75x 120/ 360= 27.916 rotations.

SELECTION OF SPROCKET

Based on the Output Speed of Shaft 50 Rpm so we have selected sprocket which is having teeth Z=18 and Outer Diameter 80 mm. Which satisfied the required Output.

3.2 DYNAMO CALCULATION

The e.m.f induced in the armature of an alternator is similar to that of DC Generator.

EMF induced / Ph

$e = ZN\emptyset P/60$ Volts

Where,   Z = no. of conductor in series / phase
        N = Rotation of magnet
        $\emptyset$ = Flux produced per pole
        P = no. of poles

According to Specification of Dynamo
No. of turns   = 1000
Winding material = Copper
Current produced = AC
Winding   = 2

Z = 2 Conductors in series / phase

Assuming-- when
N = 50 Rotation of magnet
Assume Ø=3.6 web/Second per pole
P = 2 no. of Poles

EMF induced
e = ZNØP/60
 = 2 x 50 x 3.6 x 2 / 60
e = 12 Volts

Therefore, the maximum theoretical voltage produced by the dynamo is 12 volts.

4. 3-D MODEL OF POWER GENERATION

5. ADVANTAGES

1.   Pollution free power generation.
2.   Less floor area required and no obstruction to traffic.
3.   No need of manpower during power generation.
4.   Simple construction, mature technology and easy maintenance.
5.   No consumption of any fossil fuel which is non-renewable source of energy.
6.   No external source is needed for power generation.
7.   Energy available all year round.
8.   No effect on the moving vehicle.

DISADVANTAGES:

1.   Easy for maintenance and no fuel transportation problem.
2.   Pollution free power generation.
3.   Less floor area required and no obstruction to traffic.

4. No need of manpower during power generation.
5. Simple construction, mature technology and easy maintenance.
6. No consumption of any fossil fuel which is non-renewable source of energy.
7. No external source is needed for power generation.
8. Energy available all year round.

9. No effect on the moving vehicle.

6. APPLICATIONS

1. This technique can be used in all highways.
2. This technique can be used in all roadways Speed brake.

7. CONCLUSION

Electricity plays an very important role in our life". Due to population explosion, the current power generation has become insufficient to fulfill our requirements. In this project we discover technology to generate electricity from speed breakers in which the system used is reliable and this technique will help conserve our natural resources. In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that get wasted in illuminating the street lights. As the conventional sources are depleting very fast, it's high time to think of alternative resources. 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.

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REFERENCES

1) H. G. Patil - Design Data Hand Book –ShriShashiprakashan, Belgaum,4th Edition 2007
2) K Mahadevan and Balaveera Reddy- Design Data Hand Book- CBS Publication,3rd Edition, 2010
3) R. S. Khurmi & J. K. Gupta - Machine Design- Eurasia publishing house New Delhi,14th Edition, 2008