Electricity Generation By Using Speed Breaker

Shinde Sandip Vyankat[1], Pandhare Manoj Khandu[2], LandgeTejas Kamlakar[3], Mulani Faisal Khalil[4] , Prof. Waghmare Vikas Pandurang[5]
[1, 2, 3, 4] Dept of Mechanical Engineering
[5]GuideLecturer, Dept of Mechanical Engineering
[1, 2, 3, 4, 5] Vishweshwarayya Abhiyantriki Padvika Mahavidhyalaya, Almala, Maharashtra, India.

Abstract- *Man in his lifetime, uses energy in one form or the other. In fact whatever happens in nature, results, out of the conversion of energy in one form or the other? The blowing of the wind, the formation of the clouds and the flow of water are a few examples that stand testimony to this fact. The extensive usage of energy has resulted in an energy crisis, and there is a need to develop methods of optimal utilization, which will not only ease the crisis but also preserve the environment. In this paper the electricity is generated through the sliding mechanism. For obtaining the electricity through the sliding mechanism a prototype model is developed and studied. Findings from this research work are discussed in this project. This research work used a permanent magnet D.C. generator thereby generating 12 Volt D.C. This D.C. voltage is stored to the lead 12-volt battery. Electricity stored in battery is used to activate the light, fan etc. By increasing the capacity of the battery power rating is increased.*

Keywords- Rack and Pinion, Spur Gear, Motor, Sprocket, Speed breaker.

I. LITERATURE REVIEW

The thought of generating electricity basically started from South Africa, where, a businessman felt the need for a generation of electricity without compromising on any resources. For this purpose, he thought of an idea and also brought into existence, the working model of this idea. His idea was to generate electricity using speed breakers. These speed breakers use the concepts of physics to convert the kinetic energy possessed by the vehicles running on the road into electrical energy, eventually generating electricity. This is where the plot for energy generating speed breakers was laid, later on, IIT Guwahati took over this project to overcome its limitations. The practical implementation of the electricity generating speed breaker has been very less and the result of the few places where it is implemented is still not known. Although, there have been many surveys to support the implementation of this idea. One such survey was done by the Tamil Nadu electricity board. According to this survey, the electricity consumed by a remote village for 45 days is equal to the electricity consumed by all the street lights in one night in Chennai city. By this scenario, we can get an idea of the rate by which electricity is being consumed in India, also, this consumption rate is increasing day by day. Electricity and power can be called as the backbone for development and modernization of the country and therefore, the rapid speed of development has lead to a constant increase in the rate of electricity consumption. The figures also show a rapid increase in the electricity consumption in India from the year 2014 to 2017, the electricity consumption per capita of India in the year 2014 was 805.60kwh, whereas it was 1149kwh in the year 2017. Taking into consideration this situation, it is mandatory that either consumption of electricity must be reduced or the generation of electricity must be increased. The consumption of electricity can be reduced only to a certain limit, beyond this limit the development can be hampered. But, by conservation, the amount of electricity conserved will be in very small amount, hence, increasing the generation of electricity is the right option. Now, this increase in generation of electricity would result in more and more use of conventional resources, which are also on decrease, this creates a need to generate electricity without using conventional resources or at least using conventional resources in very small amount. Here the Electricity generating speed breaker would be perfect to apply as it can generate electricity without using any of the conventional resources.

INTRODUCTION

In This Project We Are Trying To Generate The Electricity By Using Speed Breaker. Now-ADays Electric Energy Is Lot In Each And Every Ones Mind. Well It Is Now Possible While You Are Driving Your Car Or Riding Any Kind Of Two Wheeler. This Can Be Done When We Drive Or Ride Over A Speed Breaker. Yes You Read It Right While Riding Or Driving Over A Speed Breaker. The Conventional Speed Breakers Are Only Used To Reduce The Speed Of A Vehicle Which Totally Depends On The Material With Which The Speed Breakers Are Made. Sometimes These Speed Breakers Are Made Of Rubber, Sometimes Of Concrete Or Sometimes Mixture Of Concrete And Pavements.This Can Be Done By Introducing Some Of Simple Mechanisms Under The Speed Breakers.[1] One Such Simple Mechanism Is A Rack And Pinion Gear While The Other One Is A Small Generator With Some Wiring. With The Help Of These Small

Mechanisms Here Is How We Can Implement The Power Generation Program From The Speed Breakers Large Amounts Amount Of Electricity Can Be Generated Saving Lot Of Money. And If Implemented Will Be Very Beneficial For Government . When Vehicle Is In Motion It Produces Various Forms Of Energy Like, Due To Friction Between Vehicles Wheel And Road I.E. Rough Surface HEAT Energy Is Produced, Also When Vehicle Traveling At High Speed Strikes The Wind. The Principle Involved Is POTENTIAL ENERGY TO ELECTRICAL ENERGY CONVERSION. There Is A System To Generate Power By Converting The Potential Energy Generated By A Vehicle Going Up On A Speed Breaker Into Kinetic Energy. When The Vehicle Moves Over The Inclined Plates, It GainsHeight Resulting In Increase In Potential Energy, Which Is Wasted In A Conventional Rumble Strip. When The Breaker Comes Down, Then Crank A Lever Fitted To A Ratchet-Wheel Type Mechanism (A Angular Motion Converter) Which In Turn Rotates A Geared Shaft Loaded With Recoil Springs. The Output Of This Shaft Is Coupled To A Dynamo To Convert Kinetic Energy Into Electricity. 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. During Last Few Decades, Electrical Energy Is The Basic Requirement Of Human Beings. The Ratio Of Electricity.

WORKING PRINCIPLE

The Work 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 Gear And Pinion Arrangements. Here The Reciprocating Motion Of The Speed-Breaker Is Converted Into Rotary Motion Using The Connecting Rod And Crank Shaft Arrangement. The Axis Of The Crankshaft Is Coupled With The Larger Gear.The Gear Arrangement Is Made Up Of Two Gears. One Of Larger Size And The Other Of Smaller Size. Both The Gears Are Connected Are Meshed Directly Which Serves In Transmitting Power From The Larger Gear To The Smaller Pinion. As The Power Is Transmitted From The Larger Gear To The Smaller Pinion, The Speed That Is Available At The Larger Gear Is Relatively Multiplied At The Rotation Of The Smaller Pinion. The work 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 gear and pinion arrangements. Here the reciprocating motion of the speed-breaker is converted into rotary motion using the connecting rod and crank shaft arrangement. The axis of the crankshaft is coupled with the larger gear. The gear arrangement is made up of two gears. One of larger size and the other of smaller size. Both the gears are connected are meshed directly which serves in transmitting power from the larger gear to the smaller pinion. As the power is transmitted from the larger gear to the smaller pinion, the speed that is available at the larger gear is relatively multiplied at the rotation of the smaller pinion

CONSTRUCTION

Fig No 1 Model

1.1 Rack and Pinion Gear:-

This is one of the simplest types of gears and can be manufactured according to ones own need. As the name suggests this type of gear has two components namely Rack which is a straight gear with tooth in only one direction, the second component is the Pinion which is a round shaped gear and will roll upon the rack to perform its task. The alignment of this gear will be in vertical direction.

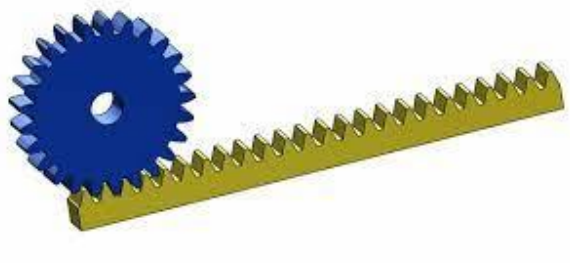


Fig No 2 RACK AND PINION

1.2 LED:-

LEDs work on the principle of Electroluminescence. On passing a current through the diode, minority charge carriers and majority charge carriers recombine at the junction. On recombination, energy is released in the form of photons. As the forward voltage increases, the intensity of the light increases and reaches a maximum.

Fig No 3 LED

1.3BEARING

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Fig No 4 Bearing

1.4 SHAFT:-

The term shaft usually refers to a component of circular cross section that rotates and transmits power from a driving device, such as a motor or engine, through a machine. Shafts can carry gears, pulleys and sprockets to transmit rotary motion and power via mating gears, belts and chains.

Fig No 5Shaft

1.5SPRING:-

It is defined as an elastic body whose function is to distort when loaded and to recover its original shape when the load is removed. It cushions, absorbs or controls energy either due to shocks or due to vibrations.

Fig No 6 Coil Spring

1.6 CHAIN SPROCKET:-

Sprockets are used in bicycles, motorcycles, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the most common form of sprocket may be found in the bicycle, in which the pedal shaft carries a large sprocket-wheel, which drives a chain, which, in turn, drives a small sprocket on the axle of the rear wheel. Early automobiles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycles.

Fig No. 7 Chain Sprocket

1.7 SUPPORTING FRAME :-

Sheet metal fabrication is the process of turning flat sheets of steel or aluminium into metal structures or products, by cutting, punching, folding and assembling. Sheet metal can be cut, bent or stretched into nearly any shape, which is generally done by cutting and burning the metal.

Fig No. 8 Supporting Frame

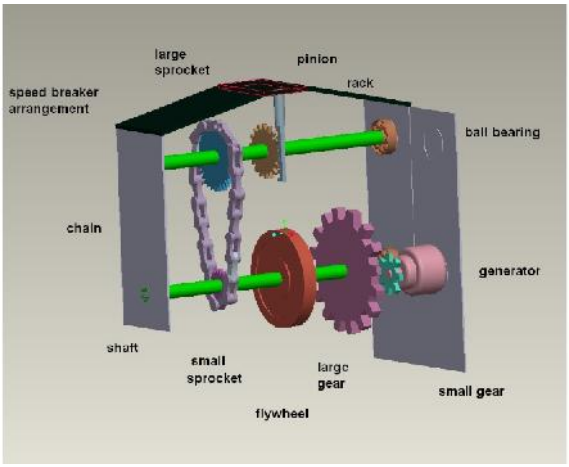
1.8 SPUR GEAR :-

Spur gears are a cylindrical shaped toothed component used in industrial equipment to transfer mechanical motion as well as control speed, power, and torque. These simple gears are costeffective, durable, reliable and provide a positive, constant speed drive to facilitate daily industrial operations.

Fig no.9 Spur Gear

II. SYSTEM DESIGN &FUNCTION

In this research, vehicle pressure on the speed breaker whichis converted into rotary energy through rack and pinion usinghydraulic press. Consequently, this rotary energy rotatesgenerator that generates electrical power which is being storedthrough battery using charging circuit The whole system isrepresented.



ADVANTAGES

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. This concept is quite promising due to its good efficiency as well as energy recovery criteria.
6. No fuel transportation problem.
7. No consumption of fossil fuel which is nonrenewable.
8. No manual work necessary during generation.
9. Energy available all year round.

10. We can use it at all places according to desired design

III. CONCLUSION

Day by day the consumption of power is increasing and the need of electricity is rising. Hence to be able to control this need of electricity consumption and reduce the use of other fossil fuels this project can be implemented into everyday life. Looking at the recent conditions of the electricity crisis in India, government focuses on utilizing the non-conventional energy sources for electricity generation and reducing the share of global warming. So, the techniques which are described above will also contribute to the power generation. It will provide electricity to villages without any extra efforts throughout year.

- It can be implemented at metropolitan cities.
- So that more electric power is produced.
- Arrangement of whole setup is easier.

The stored electricity could satisfy the daily requirement of electric power. This is generating many kilowatts power by using downward as well as the upward motion of rack. With the help of speed breaker mechanism, linear motion of rack is converted into rotary motion of pinion and thus is used to rotate the shaft of DC generator. It generates 273.24 watts with 400kg of load and 14cm of the height of the rack. DC voltages charge the batteries during the passage of moving vehicles. Using inverter (DC to AC conversion), we will be able to use batteries power for other useful applications. It can be implemented on the toll plazas, highways. Guide slots and lubricating oil sump is required to minimise friction losses. The initial cost of this arrangement is high but after the first cost, it will be free energy system.

IV. FUTURE ASPECTS

The future scope of this project is to improve the sustainability of the speed breakers that is by using various materials for the manufacturing of speed breakers. Improvement of power generation system by using other types of power generators can also be implemented. The energy generated using speed breaker mechanism can be used to store in a batteries and can be used apart for various purposes. The work basically aims to produce free electricity with no fuel cost, no pollution and with minimum requirement of space. 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. A survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most of the country is poor. Hence more research and development of technologies are needed in this field. This energy can be used for the lights on the either sides of the roads and thus power that is consumed by these lights can be utilized to send power to these villages. It may also be used for light vehicle also. This technology is still in the stage of development. In future it is used to generate the power throughout the year. Power generation is not affected by environmental conditions. It is pollution free technique for generation of electricity. Suitable at parking of multiplexes, malls, toll booths, signals, etc. Used 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.

REFERENCES

[1] http://www.aui.ma/ssecapstonerepository/pdf/spring2019/SPEEED%20BUMP%20GENERATING%20ELECTRICAL%2 0POWER.pdf
[2] https://www.slideshare.net/bratisundarnanda/power-generation-from- 30954152
[3] https://timesofindia.indiatimes.com/city/pune/patent-for-power- generating-device-from speed-breakers/article show/81518552.cms
[4] https://ijarcce.com/wp-content/uploads/2018/11/IJARCCE.2018.71010.pdf
[5] Sharma. P.C ,Principle of renewable energy systems (Public printing service, New Delhi, 2003
[6] Sharma. P.C, Non-Conventional power plants (Public printing service, New Delhi, 2003).
[7] Mukherjee. DC hakrabartiS, Non-conventional power plants (Public printing service, New Delhi, 2005).
[8] Ankita, Meenu Bala, Power Generation From Speed Breakers, International Journal Of Advance Research In Science and Engineering, 2(2), 2013.
[9] Miller R, Power System Operation, (McGraw- Hill, New York, 1970).
[10] P. E. Yearbook, "Hydrocarbon Development Institute of Pakistan," Ministry of Petroleum and Natural Resources, Government of Pakistan, p. 39, 2001.
[11] D. Zaidel, A Hakkert, and A. Pistiner,"The use of road humps for moderating speeds on urban streets," Accident Analysis & Prevention, vol. 24, pp. 45-56, 1992.
[12] F. K. Afukaar and J. Damsere-Derry, "Evaluation of speed humps on pedestrian injuries in Ghana," Injury Prevention, vol. 16, pp. A205-A206, 2010.
[13] I. Sayer, C. Baguley, and A. Downing, "Low-cost engineering measures in Egypt, Ghana and Pakistan,"
[14] PLANNING AND TRANSPORT RESEARCH AND COMPUTATION, vol. 352, 1991.

[15] J. Slatkin, "Roadway electric generator," ed: Google Patents, 2001.
[16] W. P. Le Van, "Method and apparatus for generating electricity by vehicle and pedestrian weight force," ed: Google Patents, 1976.
[17] M. Ramadan, M. Khaled, and H. El Hage, "Using speed bump for power generation– Experimental study," Energy Procedia, vol. 75, pp. 867-872, 2015.
[18] P. A. Weber and J. P. Braaksma, "Towards a North American geometric design standard for speed humps," Institute of Transportation Engineers. ITE Journal, vol. 70, p. 30, 2000.
[19] C. E. Schramm, "Green Road: Harvesting Wasted Vehicular Kinetic Energy," WORCESTER POLYTECHNIC INSTITUTE, 2016.
[20] V. Dmitriev, "Electric Power Generating Speed Bump," ed: Google Patents, 2012.
[21] P. kumarPeriasamy and S. J. Abraham, "Simple generator," ed: Google Patents, 2008.