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GENERATION OF POWER USING RAILWAY TRACK

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Abstract - *An electromagnetic energy harvester is arrangement of harness the irrational energy from the railroad track. When train passing on the track the irrational energy is produced and this energy is in the form of the low amount of power i. e., which energy is in mill watts quantity. And energy harvester is produced the more power from the irrational energy suitable for higher applicable railroad appliances like warning signals, switches, and health monitoring sensors, which has ability to consumes the power supply up to 10 watt or more. This paper is focused on the wasted irrational energy on the track is utilized by using the energy harvesters into the regulated unidirectional rotational motion. With the significance of improved reliability, efficiency, and quality of output power in the form of the DC power. It has more advantages like regulates the constant alternator RPM, and incessantly DC power supply.*

Key Words: *Railway track, energy harvesters, irrational energy, applied force*

1. INTRODUCTION

In today's fast moving world energy demands & use is even increasing to cope up with these even increasing energy demands our need to derives various mechanism those are capable to generate electricity. We well know that, Energy is an essential issue, and play an important role in our day to day life. According to law of conservation of energy, energy can neither created nor be destroyed, but can convert the energy is one form to another form. So, we can utilize the irrational energy from the railroad track when train is passing on that subway. Energy Harvesting is the process that captures the small amount of energy that would otherwise natural sources as well as human made sources. The energy demand is increasing day by day and hence new efficient energy resources need to be employed.

The energy harvesting is concentrated on the low power applications. Such as, electronics devices cell phones, etc. Energy can also be harvested to power small autonomous sensors such as, those developed using MEMS technologies these systems are often very small and requires little power, but their applications are limited by the reliance on battery power. Scavenging energy from ambient vibrations, wind, heat or light could enable smart sensors to be functional indefinitely. Several academic and commercial groups have been involved in the analysis and development of vibrations powered energy harvesting technology, including the control and power group and optical and semiconductor devices group at Imperial Collage London, IMEC and the partnering Holist center, Adoptive energy, LLC, ARVENY, MIT Boston, Victoria University of Wellington, Georgia Tech, UC Berkeley, South Amp ton university,. The National science foundation's also supports an industry co operative research center led by Virginia Tech and the University of Texas at Dallas called the center for energy harvesting materials and the systems. Current interest in low power energy harvesting is for independent sensors networks. In these applications an energy harvesting scheme puts power stores into a capacitors then boosted to a second storage capacitor or battery for use in the micro processors.

The power is usually used in sensors applications and the data stored or is transmitted possibly through wireless methods. The electromagnetic vibrations energy harvesting system having contents of mechanical conversion elements like rack and pinions, balls screw or hydraulic piston, mechanical magnifications systems, rotational electromagnetic generators, electrical rectifier ,power rectifiers and energy storage elements. The railway track electricity generator is specially planned to design and fabricate the conversion unit for utilizing the available unconventional energy source.

That is tremendously available energy in low intensity with ample quantity can be utilized. This machine converts reciprocating motion in to rotary motion. The rotational power is stored in flywheel & flywheel rotate alternator that generate electricity. Railway track electricity generation as such is not a new concept. There were many attempts in the past using pneumatics, piezoelectric materials, etc. but all of them proved very costly and were not practically feasible in day-to-day real life .The persons, which are climbing or getting down the staircase are applying the impact force or thrust on the spring loaded stair case steps.

This impact pressure energy can be utilized to operate the energy flywheel through uni-directional ratchet arrangement using chain and sprocket wheel drive. The flywheel, which stores the energy and utilizes it for continuous rotation of the generator operating pulley and belt transmission system. It is best use of non conventional source of energy, saving of coal and water for generating electricity, eco friendly, simple mechanism, easy for installation, easy for maintenance. It can be used on railway station, airports, shopping mall, jogging parks.

2. BLOCK DIAGRAM

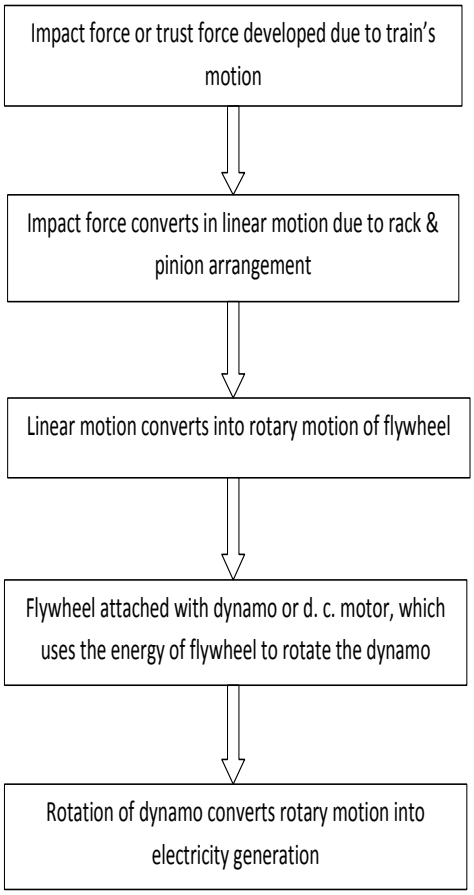

Fig. 1: Block Diagram of energy harvesting using railway track

3. WORKING PRINCIPLE

The railway track electricity generator is specially planned to design and fabricate the conversion unit for utilizing the available unconventional energy source. In today's fast moving world energy demands & use is even increasing to cope up with these even increasing energy demands our need to derives various mechanism those are capable to generate electricity . That is tremendously available energy in low intensity with ample quantity can be utilized. This machine converts reciprocating motion in to rotary motion. The rotational power is stored in flywheel & flywheel rotate alternator that generate electricity. Railway track electricity generation as such is not a new concept. There were many attempts in the past using pneumatics, electromechanical materials etc. but all of them proved very costly and were not practically feasible in day-to-day real life.

4. ARRANGMENT

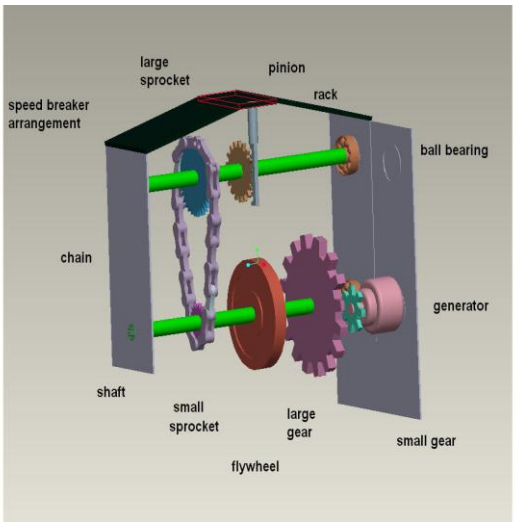

Fig. 2: Arrangement Of Component

This arrangement is placed below the railway track. When train is passing on the track then there minute displacement will occur and due to that displacement and the position of the rack goes downward and pinion will rotate. Firstly the motion of the rack and pinion is reciprocating in nature and then this rotation is converted into the linear or rotary motion with the help of spur gear. The rack and pinion and large sprocket mounted on the same shaft i.e., shaft 1. When pinion will move then the sprockets will also rotate and this sprocket will be connected to the second shaft with the help of chain drive. Small sprocket, flywheel, large and small gear as well as generator are mounted on the second shaft.When the first shaft rotated then automatically second shaft will also be rotated due to the chain drive. Flywheel which is connected to the second shaft is also rotated and maintained constant speed, and flywheel will stores the kinetic energy. This kinetic energy will be given to the generator through large and small gear and this energy finally converted into electrical energy by generator.

5. EXPERIMENTAL RESULT

Railway track of good quality have a track displacement of around 0.25 inch for a moderately loaded passing train. A sinusoidal input at 1 hz and 0.25 inch amplitude is applied to the rack. Voltages reduced for different power resistors are almost the same.

The time vs. time is plotted for the same 0.25 inch sinusoidal displacement input in following fig. the initial impact force in the first cycle is much larger than the force required in the later cycles. Once the flywheel reaches a certain rotational speed, the inertia of the flywheel will help

to reduce the forces required to continually run the harvesters.

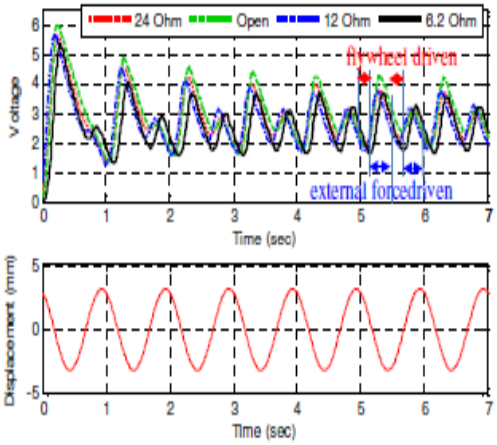

Fig.3: Voltage Generated For 0.25 In Rack Displacement At Frequency 1Hz For Various Resistors.

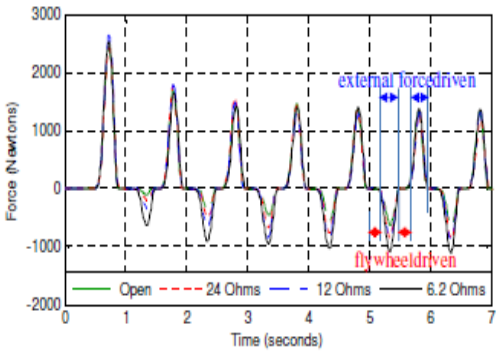

Fig. 4: Force Required For 0.25 In Rack Displacement At Frequency 1Hz For Various Resistors.

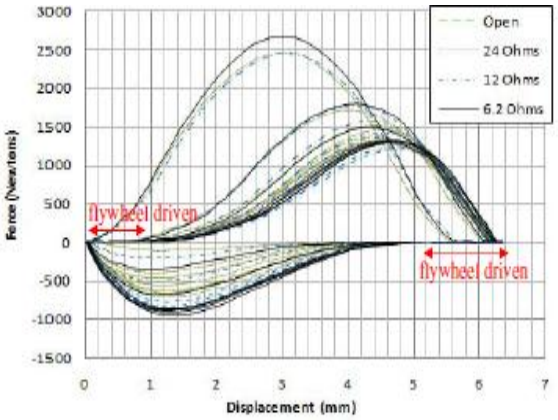

Fig.3: force displacement loops for 0.25 inch rack displacement at frequency 1Hz for various resistors.

6. RESULT DISCUSSIONS

The results are depending upon the working of the flywheel speed regulations. From above observation the voltage never reaches zero value. For the 1.0 Hz simulations, the generator consistently outputs 2 to 4 volts. And below the 1.0 Hz simulations the generator output drops as 1 volt.

Whenever the initial load for harvesters running cycle is large, and then results will be shows that load to run continual cycles smoothers. This improvement is essential in increasing the harvesters' reliability and wear resistance. The initial load is due to flywheel rotation inertia will being constant, which can be addressed in the futures by designing a flywheel with speed dependent variable inertia.

7. CONCLUSION

This paper result is that the conversion of bidirectional vibrations into unidirectional rotations of the generator will reduce the backlash impact and enable electrical generator to operate at more efficient speed. Integration of a flywheel into the vibration harvester will reduced the impact forces of pulse like loading, for productions of a continuous DC output will make the power produced by the harvesters more readily converted into useful forms.

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