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Railway Track Based Electrical Power Generation

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Abstract – *Power Generation from railway tracks is an important in today's life because its carries large number of trains moving over it. This paper is made to design a mechanism which able to carry load and generate power using simple mechanical elements. Nowadays there is a need of non conventional energy system to our country. The energy obtain from railway track is one of the suitable source of generating non-conventional energy because there is no need of fuel as a input to generate the output in the form electrical power and this is done by using simple gear drive mechanism. This mechanism carries the rack, pinion, flaps, gears, freewheel, flywheel, DC generator, battery, etc. Rack & pinion, D.C generator, battery and inverter are used as control mechanism, so that we can implement this arrangement to all railway track system and the large power generation is obtained but this type of arrangement have high initial cost.*

Key Words: **Energy Harvesting, Non-Conventional Method, Railway Tracks.**

1. INTRODUCTION

Railway is one of the most commonly used platform of transportation in the world, which is used to carry heavy loads next to shipping. The loads may be in the form of passengers or goods. Railway becomes a largest popular public transportation. Railways are always choose for passenger convenient systems and are developing various comforts and are inventing easy operation for safety.

Usage of tracking technology solutions implemented by Indian railways, shipping companies and other industries and general public have recently begun to utilize Indian railways and rely on it more than earlier. Generally the non-renewable sources of energy are the conventional source of energy, which are being used since a long time. For the improvement of the power generation technologies and to make them more convenient, non –conventional technologies have been discovered. Non-conventional energy sources are the energy sources which are continuously replenished by natural processes. All these sources are natural, renewable or inexhaustible and do not cause any environmental pollution and is eco-friendly. Moreover they do not require more expenditure. The non-conventional sources of energy are available in a large quantity in nature. With further demand for energy, man began to use the wind for gliding ships and for driving windmills, and the power of falling water to turn water for sailing ships and for driving windmills. The sun fulfills all the energy needs of man either directly or indirectly.

When train moves over the railway track, the track deflects vertically due to load exerted by the train's coaches. The vertical displacement of the track under the weight of a movement of train can connect regenerative devices i.e. a vibration energy harvester. The generated output power can be stored into the battery. World is developing at the faster rate with regards to consumption of fuel and so the shortage of energy as the sources producing them are deplorable in nature. The large amount of usage of energy has resulted in an energy crisis and there is a need to generate more methods of optimal utilization which will not only ease the crisis but also conserve the environment.

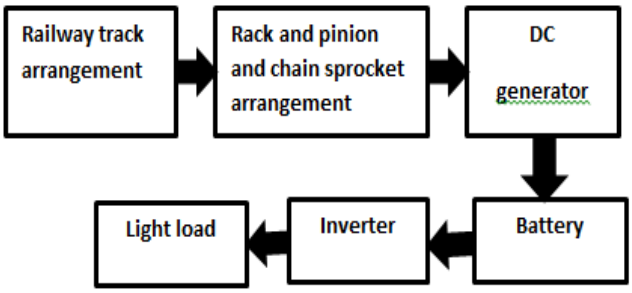

Fig. 1: Block Diagram of Generation of Power Using Railway Track

2. DISCIPTION OF HARDWARE

1. Railway Track arrangement

A railroad or railway is a track where the vehicle travels over two parallel horizontal steel bars, called as rails. The rails support & direct the wheel of the vehicles, which are traditionally either train.

2. Rack and pinion

The rack-and-pinion gear converts the rotational motion of the steering wheel into the linear motion which is required to turn the wheels. It also provides a gear reduction to turn the wheels.

3. Chain drive

The role of chain drive is used for transmitting mechanical power from one place to another place. It is often used to supply power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

4. Flywheel

A flywheel is a mechanical device which is used to store rotational energy (kinetic energy). A flywheel opposes changes in rotational speed by their moment of inertia.

5. Dc generator

A DC generator is a device which is used to convert mechanical energy generated by the mechanical arrangement of the system into electrical energy.

6. Battery

Battery is a device which is used to store energy in the form of dc output. The output of DC generator is connected to the battery.

7. Inverter

Inverter is a device which is used to convert dc energy generated by the dc generator into AC. The output of battery is connected to the inverter.

3. METHODOLOGY

3.1 Principle

The energy generated from railway track is convenient source of generating non-conventional energy because there is no need of fuel as a input to generate the output in the form electrical energy and these is done by using simple gear drive mechanism.

3.1.1 Operation:

This paper is proposing to make the railway track of length 10 ft on which the train can be moved by manual pushing. The train frame is of approximately length of 3 ft with 2 sets of wheels at front & back of strip which is aligned to put pressure on roller. At the center of the track length, this power generation mechanism which comprises of a rubber roller which is coated by a rubber ring held nearby the axle which is also holding a gear which will drive the driven gear held on another axle between bearings and housings and a drive pulley which drives the driven pulley of the generator.

The steering shaft is connected to pinion gear. When you change the direction of the steering wheel, the gear spins, moving the rack. The tie rod at end of the rack connects to the steering arm on the spindle. It is used to convert the rotational motion of the steering wheel into the linear motion needed to turn the wheels. It gives a gear reduction, making it easier to turn the wheels. Our design uses extremely simple ideas and mechanisms to achieve a complex set of actions and is intended to imitate the actions of the operators. Here, we have used small prototype of steering system with material like Steel rod, Aluminum strips, Rack Pinion Gear. When train is running on the track, the flat strip of the train will be rubbing the roller which makes the roller to rotate continuously and which ultimately rolls the gears to finally rotate the generator to generate the electricity which can be shown by glowing a set of 15 LEDs Here the power generated will be approximately 8 to12 volts depending on the speed of the rotation of the rollers. The output voltage is depending upon the number of dynamos. Then this charged battery is used for various appliances.

3.1.2 Methodology:

The track is divided into two parts, one main track of length 2140mm and another additional track of length 1840 mm; both are joined by bolts and nuts. The main track is connected with the power generation unit comprising of gear assembly, roller, the drive and drive pulleys and generator. The train unit consists with the train engine and bogies being made in zinc steel sheet of 1.5mm thick with the requisite shape which are fixed on the tubular frame of width 130mm and length 1090mm. this train frame is fixed with the wheels being held on the axles and these axles are held within ball bearings and housings which are fixed.

4. CONCLUSION

It is assured that the electric power is in nice demand; we tend to as applied scientist ought to be in discovered for brand spanking new plan of power generation. As the conventional sources are exhausting very fast, then it's time to think of other alternatives. There is a need to save the power gained from the conventional sources for efficient use. So this concept not only provides alternative but also adds to the economy of the country. Now, traffic of t is increasing, we can utilize this for power generation by means of train track power generation. It has merits that it does not utilize any external source. Now the time has come to think about these types of innovative ideas and researches should be done to upgrade their implication.

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