

Electrical Power Generation Using Railway Track

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ABSTRACT

In this paper, we are generated power by energy harvesting arrangement simply running on the railway track for power applications. Today there is a need of Non-conventional energy system to our nation. The energy obtain from railway track is one source of to generate non-conventional energy because there is no need of fuel as a input to generate the output in the form electrical power and these is done by using simple gear drive mechanism. These mechanism carries the flap, rack and pinion, gears, freewheel, flywheel, DC generator, battery. The main focus of this arrangement is the harvesting large amount of power from railway track which can be used to power the track side infrastructures which has power rating up 8 to 10 watts or more.

Keywords : Energy, Energy Harvesting, Non-conventional Method, Rail Road.

I. INTRODUCTION

Commuter rail and subway are including railway transportation which play an important role in the economy and quality everyday life. To facilitate policymakers and transportation into making informed decisions on operating transportation systems, it is essential that railway track-side equipment (signal lights, wireless communication monitoring devices, positive train control, etc.) are well maintained and operated.

When train moves over the track, the track deflects vertically due to load exerted by the train's bogies. The vertical displacement of the track under the weight of a passing train can connected regenerative devices i.e. a vibration energy harvester. The generated power can be stored into the battery and used to power track side equipments. Railroad energy harvesting is no trivial disturbance.

The mechanical motion converter in our design feature a flywheel integrated along output shaft. Given typical track input, the flywheel is designed for maintain the generator speed close to optimal value. The electrical generator will no longer operate at discontinuous

speeds, producing more energy efficiently. The reduce impact force on component during operation, trading off for larger initial starting force. The flywheel is also enabling the harvester to produce more a continuous DC power output without electrical converter component when train move over the track. This type of continual power output is more easily utilized and converted. The main focus of our aim is to harvest a larger amount of power from the rail. We are harvesting large amount of energy from power track side equipment which has power rating up 8 to 10 watts or more.

II. BLOCK DIAGRAM

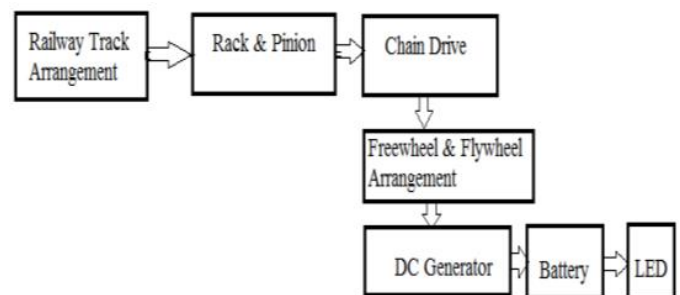


Figure 1. Block Diagram of Generation of Power Using Railway Track

2.1 HARDWARE DESCRIPTION

i) Railway Track arrangement

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

ii) Rack and Pinion

Rack & pinion used rotational motor to affect the linear motion via a rack & pinion combination. They are used frequently in long travel applications that require high stiffness & accuracy.

iii) Chain Drive

Chain drive is used for transmitting mechanical power from one place to another place. It is often used to convey power to the wheel of vehicle. The power is transmitted by roller chain, known as the chain drive.

iv) Flywheel

A flywheel is a rotating mechanical device that is used to store rotational energy and also maintain the constant speed. Flywheels have moment of inertia and thus resist changes in rotational speed. The amount of energy stored in a flywheel is proportional to the square of its rotational speed. Energy is transferred to a flywheel by application of a torque to it, thereby increasing its rotational speed, and its stored energy.

v) Freewheel

In mechanical or automobile engineering freewheel or overrunning clutch is a device in a transmission that disengages the driveshaft from the driveshaft rotate from the driven shaft rotate faster than the driveshaft. An overdrive is sometimes mistakenly called as freewheel.

vi) DC Generator

An electrical generator is a device that converts mechanical energy to electrical energy, generally using electromagnetic induction. The source of mechanical energy may be a reciprocating or turbine steam engine, water falling through a turbine or waterwheel, an internal combustion engine, a wind turbine, a hand crank, or any other source of mechanical energy.

vii) Battery

To charge a battery from AC we need a step down transformer, rectifier, filtering circuit, regulator to maintain the constant voltage then we can give that voltage to the battery to charge it. Think if you have only DC voltage and charge the lead acid battery, we can do it by giving that DC voltage to a DC-DC voltage regulator and some extra circuitry before giving to the lead acid battery.

III. CIRCUIT DIAGRAM

- | | |
|-------------------|---------------------|
| (1) Railway track | (8) Chain drive |
| (2) Flap | (9) Small freewheel |
| (3) Return spring | (10) Flywheel |
| (4) Rack | (11) Generator |
| (5) Shaft | (12) Battery |
| (6) Big freewheel | (14) Pinion |
| (7 & 13) support | |

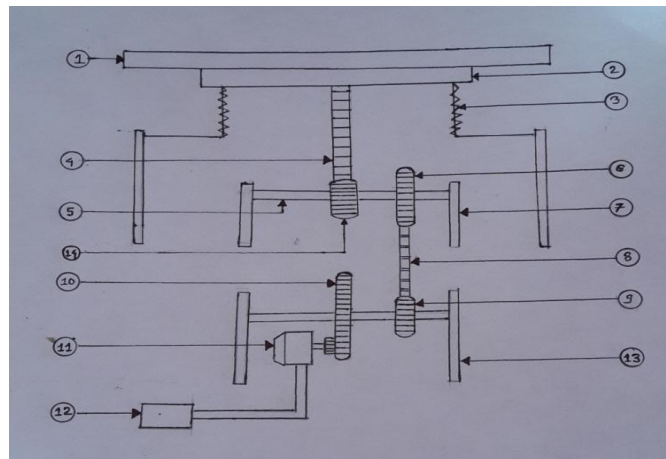


Figure 2. Circuit for Generation of Power Using Railway Track

IV. PROPOSED SYSTEM

When a train move over the track, the track deflects in downward direction due to the load exerted by the train's bogies. Also due the deflection of track there is a deflection of timber which is place below the track and therefore the flap is moving in downward direction as the flap is moving in a downward direction the spring which is attached to flap get compress in downward direction and hence rack is also move in downward direction and due to these pinion get rotates and therefore Bigger freewheel rotated because both are mounted on same shaft. As there is a rotation of bigger freewheel then the smaller freewheel is also

rotated through chain drive. The freewheel and flywheel are mounted on same shaft therefore the flywheel also rotated. The flywheel is attached to the shaft of the generator so if the flywheel will rotated then there is a rotation shaft generator and power get generated and that power is stored into the battery.

V. CONCLUSION

It is observed that the electrical power is in great demand, we as electrical engineer should be in discovered for new idea of power generation. As energy can never be created or destroyed, we should transform it into the form that we can used to supply for railway station equipment light, fan, signal light etc. we can implement this system at both entry and leaving point in the railway station This arrangement can be used in different application like in foot step or speed breaker at school, colleges and highway for generation ways of electrical energy. So that the power production rate is increased and demand at particular area can be fulfilled.

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VII. REFERENCES

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