

Electric Power Generation using Railway Track

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Abstract: In this paper, we are generating power by energy harvesting arrangement by simply running the rail on the railway track for power applications. Today there is a need of Non-conventional energy system to our nation. The energy obtained from railway track is one source to generate non-conventional energy because there is no need of fuel to generate the output in the form of electrical power and this is done by using gear drive mechanism. These mechanism carries the flap, rack and pinion, 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 to 6 to 10 watts. The energy generated will be stored in the battery and also showing the output by glowing a set of 12 to 15 LEDs.

Keywords: Generators, policy makers and accuracy

1. Introduction

While undergoing survey on Indian railways the outcome of survey was “Indian railways” are called as lifeline of our country in which around 2.3 crore of passengers travels daily. We came to the research that there are several villages facing lack of electricity even though railway tracks pass through them. So by knowing such condition, we decide to build a type project which will provide electricity by use of those railway tracks with less cost which is named as “free energy from railway track”. 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. The main focus of our aim is to harvest a larger amount of power from the railway which can be also used to provide electricity to villages and remote areas

2. Objective

- To design and fabricate the railway track mechanism to be able to rotate the shaft which ultimately rotate the generator. The generated power is shown by glowing a set of 15 LEDs or by storing into the battery, which can be used later on for lighting of surroundings of railway signal, LCD displays for passenger list and train timings etc.
- To produce electricity by using Non-Conventional energy Source and utilize it for various purposes.

3. Circuit diagram

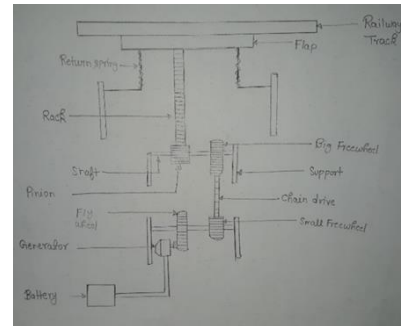


Fig. 1. Circuit for generation of power using railway track

4. Component description

1) 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.

2) 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.

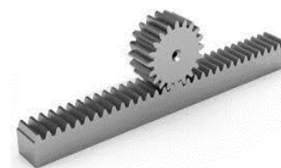


Fig. 2. Rack and pinion

3) 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.



Fig. 3. Chain drive

4) 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.

5) 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.



Fig. 4. Freewheel drive

6) 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.



Fig. 5. D.C generator

7) Battery

To charge a battery from AC we need a stepdown 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.



Fig. 6. Battery

5. Block diagram

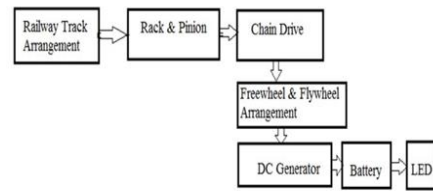


Fig. 7. Block diagram for generation of power using railway

6. Working

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 rotate then there is a rotation shaft generator and power get generated and that power is stored into the battery.

7. Advantages and importance

1. This project can be quite helpful in overcoming somehow the electricity crisis.
2. At high level if it should be planted it can cover the electricity consumption of the railway tracks and stations.
3. By the generation we can provide electricity to areas nearby the railway tracks.
4. Power generation is simple
5. No need fuel input.
6. Battery used to store the generated power.
7. Not too much costly.
8. Need minimum effort for maintenance.
9. Only initial installment cost.
10. No pollution.



Fig. 8. Isometric view of proposed project model

8. Conclusion

As energy can never be created or destroyed, we should transform it into the form that we can use to supply for railway station equipment like 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. In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, then it's time to think of alternatives. 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. Now, train traffic is increasing, we can utilize this for power generation by means of train track power generation. It has advantage that it does not utilize any external source. Now the time has come to put forte these types of innovative ideas, and researches should be done to upgrade their implication.

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