

GENERATION OF ELECTRIC ENERGY IN DIFFERENT WAYS FROM A MOVING TRAIN

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ABSTRACT

In the industrial actions and domestic loads are dependent on low cost and continues supply of electrical energy. Even in the advancement of the country is self-possessed in all positions as per the capital usage of electrical energy. The same as in the case of trains, the major way of transport of goods and people from one place to another place in India and throughout the world. This paper significance on the design of the electrical energy in the highly advanced technique. In this paper 3 different types of renewable energies like wind energy, solar energy, rotational energy is used for the gathering and generation of electric energy. These are the most efficient ways of generating the electricity from a moving train. wherever there is a limited fuel supply these methods are used. The train wheels and the train top are used in the generation of electricity. When these rollers are rotated the rotational energy is generated and it is amplified and converted to the electrical energy. By placing the solar cells and mini wind turbines on the top of the train helps in generation of wind and solar energy hence it converted into electric energy. This generated electric energy is used for the uninterrupted power supply, and charging electronic and electrical gadgets, signal lights, LED lights etc. Most populated cities like Mumbai, Kolkata, Chennai and Delhi etc. In India, these methods should be implemented.

KEYWORDS: Rotational Energy, Electric Traction, Train Wheels, Wind Energy, Solar Energy, Wind Turbine, Conversion, Solar Cells.

INTRODUCTION

The Railways are the biggest network of transportation of large quantity in the number of trains. In this modern era the large amount of energy is required for each and everyone's life from morning to evening a large amount of electricity is consumed by us. Fossil fuels like coal, diesel etc. are diminishing day by day and then exhausted in a very fast rate. Hence searching of new sources of energy is very important. These concepts are the alternative sources for generation of electricity. Generation of electricity is done by following ways on a fast-moving train, they are.

(1) By using train wheels.

(2) By installing wind turbine on the train.

(3) By placing a solar cell on the train roof.

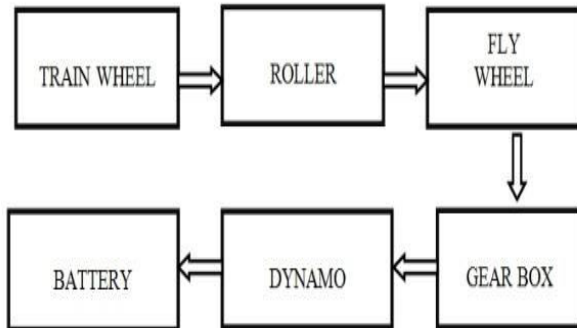
The kinetic energy of air, rotational energy of wheels, photo voltaic cells of pv panels helps in generation of electric energy.

In this research we will discuss that: Solar Energy+Wind Energy+Rotational Energy=Electrical Energy

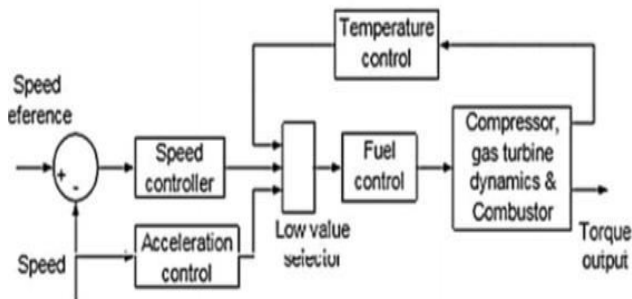
1.GENERATION FROM TRAIN WHEELS

Generation of electricity is done by the moving train wheels. In this the rotational energy is converted or transformed into electrical energy. The generation is done when the train is only in motion. Here the generated energy is stored

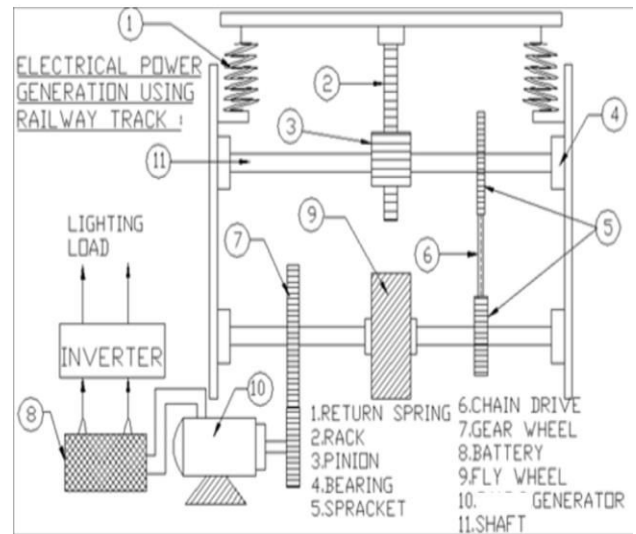
in batteries (DC) and it is used for charging the electronic items and used for backup supply in emergency. This energy is used by small lights and fans which are present in the train. The generation is done by the mini rotor which is mounted on the shaft of train wheels. The speed is maintained constantly by using gear box.



Fig(1A) Block diagram



Fig(1B) Block diagram of a mini turbine



Fig(1C) Detail view of power generation through train wheels

In the above fig(1C) the details are clearly given that the train wheels are connected to the generator using gear box and is connected to a battery and hence we can directly use DC supply, or we can convert the DC source to AC source by using inverter and used for AC appliances. By using a transformer, we can get our required voltage level.

ADVANTAGES:

1. Easy generation of electricity due to presence of more wheels for a single train
2. High amount of electrical energy is generated.
3. Easy installation

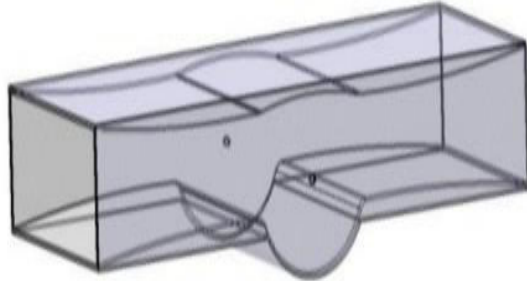
DISADVANTAGES:

1. Installation cost is high.
2. Maintenance is high.
3. Risk of stealing batteries.

2.GENERATION FROM WIND TURBINES

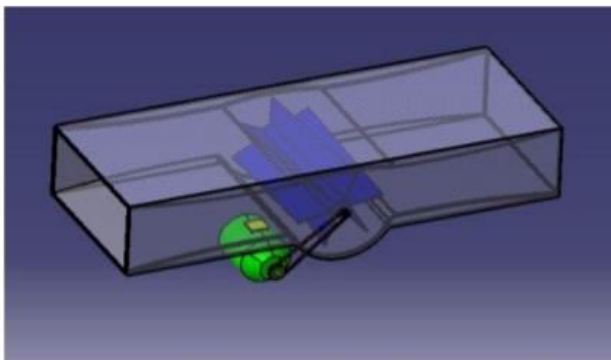
'Wind or air' plays a vital role in generation of electricity. For generation wind turbines are required. Wind turbines are of different types but in the case of trains a DUCT is placed. A duct is a pipe or tube or a canal type of structure which is used to converge a large amount of air and it is

used to increase the velocity of air which is used to rotate the wind turbine.

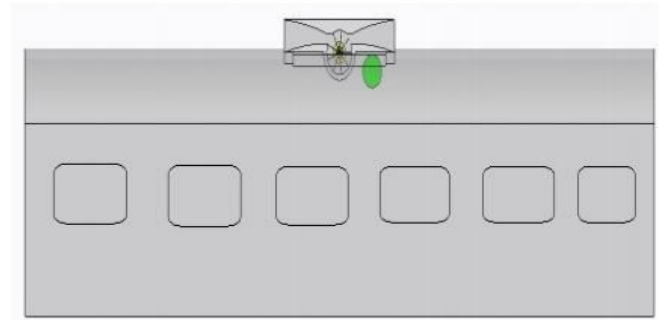


Fig(2A) Design of DUCT

A wind turbine is placed in the middle of the duct. When the train moves the air enters the duct. Due to the shape and structure of duct the velocity of air increases. Hence this increased velocity of air hits the blades of the turbine thus the wind turbine starts rotating and the generator which is coupled to the turbine rotates and generates electricity. This generated electricity is either stored in batteries or used for lighting and for fans and for charging purpose.



Fig(2B) Internal construction of wind turbine in a DUCT



Fig(2C) Basic setup of wind turbine on a coach

ADVANTAGES:

1. Generation of electricity is high.
2. Maintenance is low.
3. Efficiency is high.

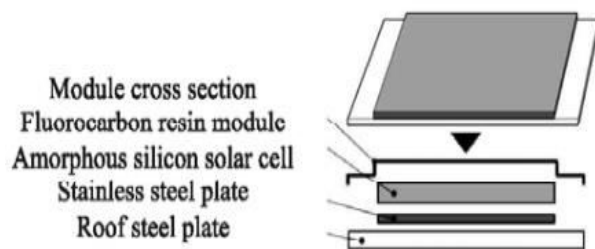
DISADVANTAGES:

1. Installation cost is high.
2. Any waste materials which fly in air will block the turbine.
3. Birds will lay nests in the duct.

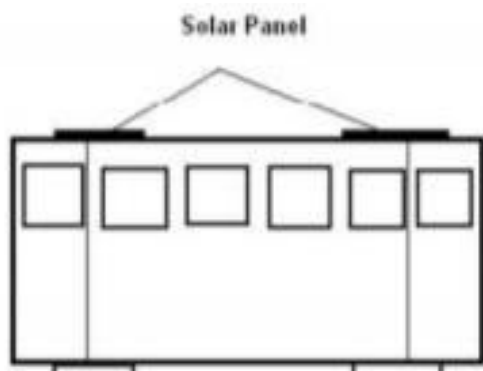
3.GENERATION FROM SOLAR PANELS

Nowadays the usage of solar energy is increased rapidly in each and every industry, factory, and go-down there are installing the solar panels for the generation of electric energy. The solar panels contain 'photo voltaic cells' which are used to capture the solar energy and convert it to the electric energy. These are also called as solar cells. The solar cells are connected in series and parallel connection. Nowadays we came across the solar power trains i.e., the trains which run on solar energy. The solar power trains are kept in motion by placing pv panels on the top of the trains or the railway lines. This system brings many financial benefits for the continuous supply of electric energy. This renewable energy is more useful to generate electricity. These pv panels are connected to a single grid. The main cell

materials are mainly classified as 'crystal silicon and amorphous silicon' materials. Tempered glasses are used to cover the cells and waterproof material like tetra resin films are used to enclose the surface and also fireproof materials are used to construct the pv panels.



Fig(3A) Architecture of a solar panel



Fig(3B) Basic setup of a solar panels on a coach

ADVANTAGES:

1. Electricity bills are reduced due to the own generation.
2. Maintenance cost is less.
3. Uses in diverse applications.

DISADVANTAGES:

1. Installation cost is very high.
2. Risk of theft of solar panels.

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3. It depends on weather conditions.

CONCLUSION

In this paper, the renewable energy sources are used to generate electrical energy. In this we are considering a train and the maximum ways to generate electricity by using a single train. In this we considered 3 methods to generate electricity. These renewable sources used are generated by using train wheels and train roof top. This energy generation is done only when the train is in running position. The main generation is done by the DC motor the output of this motor is directly charge the batteries. This stored energy is used for different purposes for example charging, lighting, signal lights, fans etc. But the major feedback of this system is there is no continues generation of energy. Because the generation from train wheels and wind turbine is generated only when the train is in running position when there is a halt there is no generation from both the systems. And in case of solar panels the generation is done only when sun light falls on the pv cells but when the weather changes and in night times there is no generation of electric energy from the solar panels. The main drawback of this system is the cost of installation is very high and the storage of batteries is very difficult. The damage in any battery or any disconnection in any battery leads to major problem. And rectification is difficult. The advantage of this system is more generation of electric energy and continuous supply of backup power and etc.

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