



Foot Step Power Generation

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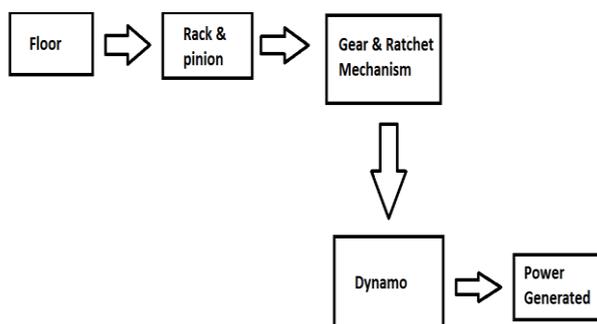
Abstract

Power generation is one of the issues. Now -a-days number of power sources are present, non-renewable and renewable, but still we cannot overcome our power needs. Among these human population is one of the resources. In this project we are generating power by running or walking. Power can be generated by walking upon stairs. This system can be installed in homes, schools, colleges, where the people move around the clock. When the people walk on the steps or that of platform, power is generated by using weight of person. This mechanical energy applied on the crystal into electrical energy. When there is some vibrations, stress or straining force exert by foot on flat platform.

Keywords: Renewable Energy power, Electrical Energy, Mechanical Energy, Foot Step

INTRODUCTION

In India, there are several hours of daily power-cuts in rural areas as well as in urban areas like metro cities due to the increase in demand of electricity. As result, people in our country are forced to use rechargeable batteries or a diesel/petrol-run electric generator during such condition. The use of generators is common in industries but it is unusual to utilize it at home. Because of the cost to run the diesel/petrol-run electric generator is high. Besides, it also causes pollution which increases Global warming so proposed method which can be a help in smaller scale to save the power in the urban areas like metro cities and the power saved by this method can be used to light up the rural areas. In the future, there are chances of having more number of methods available to produce the electricity by non-conventional method. The technology is concentrated on the increasing the efficiency of the equipment used for the non-conventional method power generation. Increasing the efficiency induce the increase in the amount of generating electricity with the some or less amount of input energy that is used prior. To develop a method this is economically suitable for the mass production of the power generation by non-conventional method is a challenge..



OBJECTIVES

In this project we are converting Mechanical energy into Electrical energy. We are trying to utilize the wasted energy in a useful way. By using Rack and Pinion arrangement we are converting the motion of the steps into rotational motion of the dynamo.

In first foot step we are using rack and pinion arrangement directly to rotate the dynamo. But in second step we are using gear mechanism to obtain better efficiency. Through Dynamo the rotational energy is converted into electrical energy. This electrical energy output will be shown by glowing the LEDs. The output power is expected to be 3 to 4V in prototype.

Depending upon the below Literature Survey of different papers we have decided to move forward to take this project in practical means. For this purpose we have aimed to construct a prototype for footstep mechanism by using rack and pinion motion. And also the storage system along with inverter circuit is arrangement in order to use the produced alternative energy for daily application by converting the DC to AC. At last the prototype is assembled with a display unit whose main aim is to show the exact amount of power available battery.

“Generation of Electrical Energy from Foot Step Using Rack and Pinion Mechanism” by Md.Azhar, Zitender Rajpurohit, Abdul Saif, Nalla Abhinay, P.Sai Chandu

In this research paper authors used regulated 5V power, 500mA power supply. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. A rack and pinion is a type of linear actuator including a pair of gears which convert rotational motion into linear motion. The “pinion” engages teeth on the rack. In this paper, since the power generation using foot step gets its energy requirements from a non-renewable source of energy. There is no need of power from external sources (mains) and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of foot step which is used to generate the non-conventional energy like electricity.

“Power Generation Footstep” by Shiraz Afzal, Farrukh hafeez

This paper is all about generating electricity when people walk on the floor if we are able to design a power generating floor that can produce 100W on just 12 steps, then for 120 steps we can produce 1000 Watt and if we install such type of 100 floors with this system then it can produce 1 MegaWatt. As a fact only 11% of renewable energy contributes to our primary energy. If this project is deployed, then not only we can overcome the energy crisis problem but this also contributes to create a healthy global environmental change. In this project a gear system is attached with a flywheel which causes to rotate the dynamo as the tile on the deck is pressed. The power that is created is saved in the batteries. In addition, we will be able to monitor and control the amount of electricity generated. When an individual passes it pushes the tile on the ground surface which turns the shaft beneath the tile, turn is limited by a clutch bearing which is underpinned by holders. Primary shaft rotates approx. twice by a single tile push. The movement of the prevailing shaft turns the International Journal of Engineering Trends and Applications (IJETA) – Volume 5 Issue 2, Mar- Apr 2018 ISSN:2393-9516 www.ijetajournal.org Page 295 gearbox shaft which builds it 15 times (1:15) then its movement is smoothed by the help of a fly wheel which temporarily stores the movement, which is conveyed to the DC generator (it generates 12V 40 amp at 1000 rpm).

“Power generation through step” by Vipin Kumar Yadav1, Vivek Kumar Yadav1, Rajat Kumar1, Ajay Yadav

In these research paper authors used equipment's with following specification: Motor Voltage: 10 volt Type: D.C. Generator, RPM: 1000 rpm, Gear 1- Mild Steel, No. of teeth: 59 (big gear), No. of teeth: 36 (small gear), Type: Spur Gear, No. of gear used: 2 Spring 1- Load bearing capacity: 60-90 kg, Mild Steel, Total displacement: 5 inch, Bearing 1- Type: Ball bearing, Bearing no. N35, Shaft 1- Diameter: 15 mm- Material: Mild steel author concluded that with these methods energy conversion is simple, efficient and pollution free.

METHODOLOGY

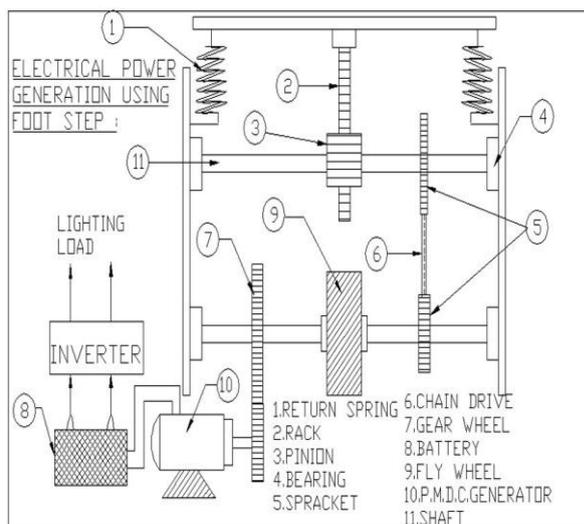
The working of the Foot Step Electric Converter (FSEC) is demonstrated:

When force is applied on the plate by standing on the plate, the spring gets compressed.

The rack here moves vertically down.

The pinion meshed with the rack gear results in circular motion of the pinion gear.

For one full compression, the pinion moves 1 full circle.



When the force is released from the plate, the pinion reverses and moves another circle, causing rotation of gear pairs.

The generator attached to the last gear hence results in the dc power generation. The power generated by the foot step generator can be stored in an energy storing device. The output of the generator was fed to a 12 V lead acid battery, through an ac-dc. Converter bridge. Initially, the battery was completely discharged. Then, the FSEC was operated by applying foot load and energy was stored in the battery. A 100 W, 230V bulb was connected to the battery through an inverter.

WORKING PRINCIPLE

The complete fabricated model picture of Foot Step is shown above. The upper plate is mounted on two springs; the weight impact is converted into electrical power with proper control unit. The spring and rack & pinion arrangement is fixed below the foot step which is mounted on base. Spring system is used for return mechanism of upper plate after release of load. The shaft along with pinion is supported by end bearings. The generator is used here is 12Volt permanent magnet DC generator. The terminal of DC generator is connected to lightning LEDs.

ADVANTAGES

- Power generation is simply walking on the step.
- Power also generated by running or exercising on the Step.
- No need fuel input
- This is a Non-conventional system
- Battery is used to store the generated power

Applications

- Power generation using foot step can be used in most of the places such as colleges, schools, cinema theatres Shopping complex and Many other Buildings

RESULTS

Foot step energy generator is suitable for small amount of power generation such as charging cell phones, door lightning and hoarding street lamps.

For efficient working it should be used where people walk frequently such as malls, foot paths, railway stations, etc.

CONCLUSION

In proposed system of power generation there is no any fuel input requirement for the generation of electrical power. Thus it can also be concluded that this mode of power generation system is eco-friendly, i.e. no pollution is caused during the generation of power using this type of model. Hence due to such advantages, this system can be embedded at any of the public places like railway platforms, busy foot-paths, malls etc. Implementing this system, dependency on the conventional sources of energy can be reduced, thus it is considered as beneficial for nature and human.

Hypothesis

The design of the mechanical footstep power generator provides a way to utilize waste energy from the human foot. The energy which is lost as vibrations, sound etc. will be tapped and converted into a usable form, in this case into electricity. The electrical energy can then be used for lighting purposes as well as for charging either phones or laptops. The energy is renewable meaning it is not only cheap, readily available but also it can be replenished. The energy is also clean thus has minimal effects to the environment.

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