

Stair Case Power Generation

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Abstract

Nowadays energy and power are the one of the basic necessities regarding this modern world. As the demand of energy is increasing day by day, so the ultimate solution to deal with these sorts of problems is just to implement the renewable sources of energy. The objective of this work is power generation through footsteps as a source of renewable energy that we can obtained while walking on to the certain arrangements like footpaths, stairs, plate forms and these systems can be install elsewhere specially in the dense populated areas.

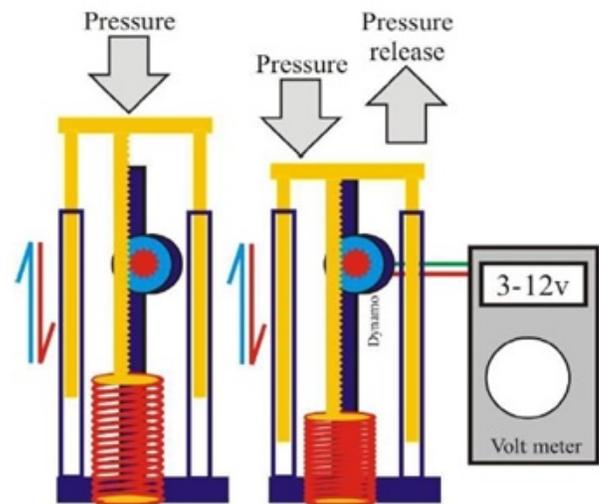
Keywords: Energy Rack, Pinion, Footsteps.

1. Introduction

Man has needed and used energy at an increasing rate for his sustenance and wellbeing ever since he came on the earth a few million years ago. Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire and his energy needs increased as he started to make use of wood and other bio mass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. He added a new dimension to the use of energy by domesticating and training animals to work for him. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important. Man has needed and used energy at an increasing rate for his sustenance and well-being ever since he came on the earth a few million years ago. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling

water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels.



Dynamo, Rack and Pinion gear working mechanism

2. Background

Earlier various researchers had work on the conversion of dynamic energy to electrical by human locomotion Jeff Krupen-kin and Ashley Taylor proposed a new technique called re-verse electro-wetting in which motion of conductive liquid on dielectric coated conductive substrate causes to create electric-al energy, so whenever there is any vibration on the upper plate due to human locomotion or by any mean could result in producing electrical energy as shown in following figure Scientist of the hull university also worked on transforming man motion in to electrical energy and get positive results. Various experiments had made in japan also to harnesses energy from footsteps. They installed the special flooring tiles on the Tokyo japan busiest stations and observe that an average person weighting 60 kg can generate 0.1 watt in single second. A similar approach with different mechanism for generation

of electricity from footstep is proposed by Tom jose V. He used rick and pinion gear system with dynamo fitting with its gear mechanism.

3. Literature Review

In the review, research papers of power generation are referred and studied. Some of the reviews are as follow,

Siba brata Mohanty , Sasank shekhar Panda ensure proper operation that meets the performance requirement, for this they determine the voltage the micro-generator can generate from various rotation speeds. This can be done by using a motor to drive the generator and using multi meter to measure the voltage. At the same time we will need to use sensors to determine the rotation speed of our gears and flywheel and adjust them in order to obtain optimum speed. Determine the capacitance and number of capacitors we will use for the storage. An oscilloscope can be used to see how long does average traffic charges up different capacitors.

Alla Chandra Sekhar¹, B Murali Kishore **have** aim of this project is to develop much cleaner cost effective way of power generation method, which in turns helps to bring down the global warming as well as reduce the power shortages In this paper they are generating electrical power as non-conventional method by simply walking or running on the foot step. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into the electrical energy. This paper uses electromagnetic induction principle. In this paper the pressure energy is converted into electrical energy. The control mechanism carries the copper coil and bar magnetic which is used to generate voltage, a rechargeable battery is used to store this generated voltage.

Kiran Boby, Aleena Paul K The piezoelectric material converts the pressure applied to it into electrical energy. The source of pressure can be either from the weight of the moving vehicles or from the weight of the people walking over it. The output of the piezoelectric material is not a steady one. So a bridge circuit is used to convert this variable voltage into a linear one. Again an AC ripple filter is used to filter out any further fluctuations in the output. The output dc voltage is then stored in a rechargeable battery. As the power output from a single piezo-film was extremely low, combination of few Piezo films was investigated. Two possible connections were tested - parallel and series connections. The parallel connection did not show significant increase in the voltage output. With series connection, additional piezo-film results in increased

of voltage output but not in linear proportion. So here a combination of both parallel and series connection is employed for producing 40V voltage output with high current density. From battery provisions are provided to connect dc load. An inverter is connected to battery to provide provision to connect AC load. The voltage produced across the tile can be seen in a LCD. For this purpose microcontroller PIC16F873A is used. The microcontroller uses a crystal oscillator for its operation. The output of the microcontroller is then given to the LCD which then displays the voltage levels.

Shiraz Afzal, Farrukh hafeez has given a same approach as was anticipated by Tom jose but different mechanism is proposed. In this paper a gear system is attached with 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 they will be able to monitor and control the amount of electricity generated. When an individual passes it push the tile on the ground surface which turn the shaft beneath the tile, turn is limited by clutch bearing which is underpinned by holders. Primary shaft is rotate approx. twice by a single tile push. The movement of the prevailing shaft turn the gearbox shaft which builds it 15 times (1:15) then its movement is smoothen by the help of fly wheel which temporary store the movement, which is convey to the DC generator (it generates 12V 40 amp at 1000 rpm). Energy generated is stored in the batteries , an inverter circuitry is implemented to convert the DC to AC ,so that we can sprint the home electrical load , Further a microcontroller based home mechanization framework is implemented which control rooms prudently. Entire framework is put on the iron bars called channels.

4. Working principle

The complete diagram of the power generation using STAIR CASE is given below. L-shapes window is inclined in certain small angle which is used to generate the power. The pushing power is converted into electrical energy by proper driving arrangement. The rack & pinion, spring arrangement is fixed at the STAIR CASE which is mounded bellow the L-shapes window. The spring is used to return the inclined L-shapes window in same position by releasing the load. The gear wheel is coupled to the smaller motor shaft. The generator is used here, is permanent magnet D.C generator. The generated voltage is 12Volt D.C. This D.C voltage is stored to the Lead-acid 12 Volt battery. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This working principle is already explained the above chapter. This 230 Volt A.C voltage is used to activate the

light, fan and etc.

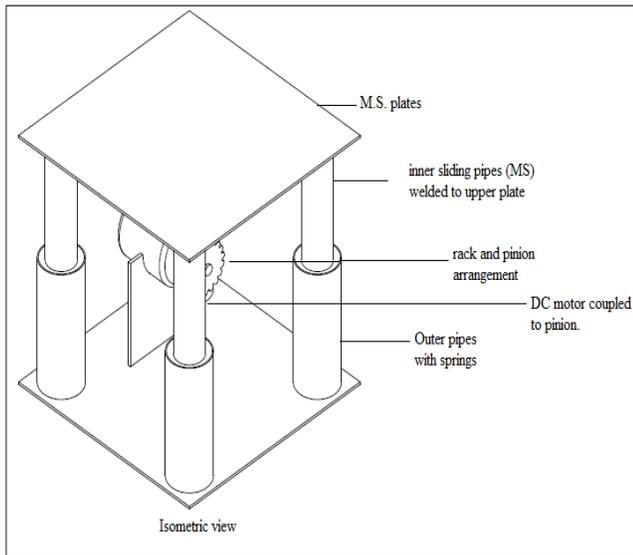


Fig.1 schematic diagram for single step

5.Procedure

In this work a gear system is attached with 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, this turn is limited by a clutch bearing which is underpinned by holders. The primary shaft rotates approximately twice by a single tile push. The movement of the prevailing shaft turns the gear which builds it 15 times (1:15) then its movement which is temporarily stored, which is conveyed to the DC generator (it generates 12V 40 amp at 1000 rpm). Energy generated is stored in the batteries, an inverter circuitry is implemented to convert the DC to AC, so that we can sprint the home electrical load. Further a microcontroller-based home mechanization framework is implemented which controls rooms prudently. The entire framework is put on the iron bars called channels.

Components of the model consist of the following main parts:

1. MS plate
2. MS Pipes
3. Rack and pinion
4. DC motor
5. STAIR FRAME
6. LED lights Etc.

6. Results

The proposed model of rack and pinion operated stair case power generation was able to produce electricity by pressing the upper plate by foot. The rack and pinion rotates the DC motor and thus the DC motor generates electrical current which is shown by LED. This current produced can also be measured by a multi-meter (electronic current, voltage measuring device).

The results obtained by our fabricated model are,

1. Minimum voltage required to glow LED = 3.3 volts
2. Maximum voltage produced by DC motor = 10.8 volts
3. Number of small LEDs running in this system = $64 \times 2 = 128$
4. Number of small 3 volt can run by this system = 250
5. Maximum current produced by DC motor = 200 milli-ampere
6. Downward displacement required for 1 rotation of pinion = 64 mm.

7. Conclusion

In concluding the words for this work, since the power generation using a stair case gets its energy requirements from the non-renewable source of energy. There is no need of power from the mains and there is less pollution in this source of energy. It is very useful to the places all roads and as well as all kinds of stair case which is used to generate the non-conventional energy like electricity. It is able to extend this project by using the same arrangement and construct in the footsteps so that increase the power production rate by fixing schools and colleges, highways etc.

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