Modification and implementation of foot step power generation System in weighting scale of the gym

[1]A.R.Kotadiya, [2]B.D.Parmar
[1]Lecturer, [2]Senior Lecturer
Mechanical Engineering Department, Government Polytechnic, Junagadh (Gujrat), India.

Abstract - Humans are using the renewable energy which are solar, wind etc. but we still could not satisfy our power needs, because of that we have to generate electricity through each and every possible ways. The objective of this paper is to produce power through footsteps as a source of renewable energy that we can obtained while walking or standing on to the certain arrangements like footpaths, stairs, plate forms and these systems can be install specially in the more populated areas. In this paper the force energy is produced by human foot step and force energy is converted into mechanical energy by the rack and pinion mechanism. electricity is produced by DC generator. This work is about to modified and combine existing methods of foot step power generation that are rack and pinion arrangement and piezoelectric crystals

Keywords - Renewable energy, Generator, Foot step, Electricity.

Introduction

This paper includes number of simple setup and component that is installed under the walking or standing platform. When person walk or stand on this platform their body weight compresses the setup of system which tends to rotates a dynamo and current produced is stored in dry battery And while the power producing platform is over crowded with moving population, energy is produced is high. More movement of people will generate more energy. This whole human foot energy being wasted, if it can be made possible to use this energy, it will become great power producing platform and will be very useful energy sources in crowded places. This method generates the electricity without polluting environment. The source of energy is continuous and renewable.

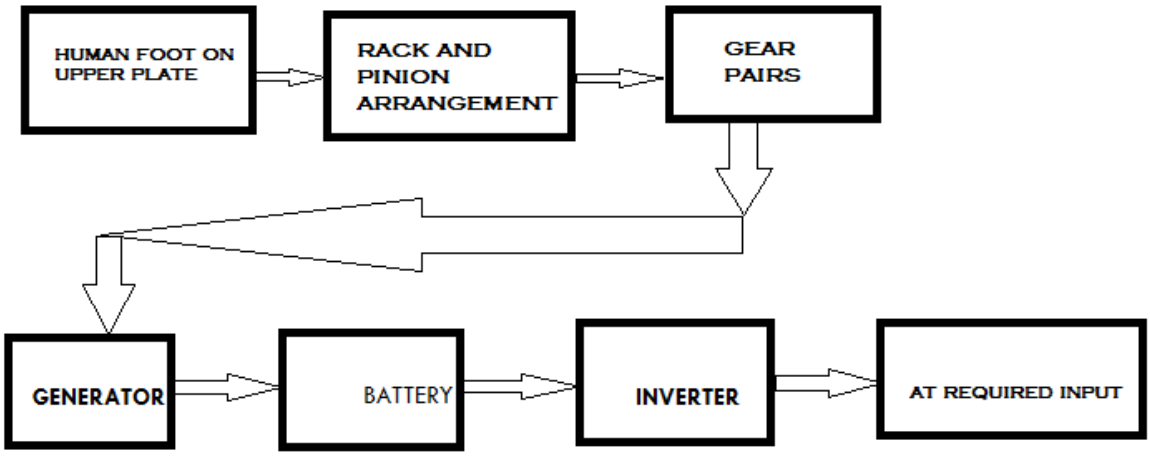


Fig 1.1 Block diagram

This block diagram shows flow of power generation and also describes sequence of movement of component. It gives over view of power generation system. As from the diagram movement take place by human and cause pinion to rotate by rack, which cause rotation of chain sprocket and flywheel on second shaft and hence power is generated by generator.

LITERATURE REVIEW

According to T.R.Deshmukh describe with design and modeling of parts of the model of the foot step power generation system using 3d modeling software creo. This process consist number of simple setup that is installed under the walking or standing platform. Project system works on the principle of converting the linear motion because to pressure of foot steps into rotating motion by rack and pinion arrangement. This mechanism fails if there is any occurrence of variable load leads to balancing type problems Power is not generated during return movement of rack.[1]

From the perspective of Sasank shekhar Panda has described the based on crank shaft; fly wheel, and gear arrangement .This type of footsteps power generation system are eligible to be installed in crowded places and rural areas. Thus this is a very good

technology to provide effective solution to power related problems to affordable extent. This will be the most acceptable means of providing power to the places that involves difficulties of transmission. Maintenance and lubrication is required time to time.[2] According to Miss. Mathane Nitashree V, Piezoelectric materials having crystalline structure. They can convert mechanical energy in the electrical energy and vice versa. The produced electrical energy from piezoelectric crystal is very low in the order of 2-3 volts and is stored in battery to charge controller, since it is not possible to charge 12v battery through crystal output. To increase the voltage, the boost converter circuit is used. Comparison between various piezo electric material shows that PZT is superior in characteristics. Also, by comparison it was found that series- parallel combination connection is more suitable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation. It is especially suited for implementation in crowded areas. [3]

Mr. Jose Ananth Vino described the simple drive mechanism which include rack and pinion assembly and chain drive mechanism. The conversion of the pressure or force energy in to electrical energy. The power generation is very high but The initial cost of this system is high. There is no need of power from the mains and these system is eco friendly. It is very useful at the crowded places and on all roads and as well as all kind of foot step which is used to generate the electricity. Maintenance and lubrication is required time to time. Power is not generated during return movement of rack.[4]

COMPONENTS OF SYSTEM

Rack and pinion:- A rack and pinion gears system is composed of two gears. The normal round gear is the pinion gear and the straight or flat gear is the rack. A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. The circular pinion engages teeth on a linear "gear" bar which is called the “rack“.

Gears : A gear is a rotating machine part having cut teeth which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine.

Springs:- A spring is defined as an elastic body, whose function to distort when loaded and to recover its original shape when the load is removed.

Ball bearing :A ball bearing is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads.

Dynamo Dynamo is an electrical generator. This dynamo produces direct current with the use of a commutator. Dynamo were the first generator capable of the power industries the dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current.

Battery In our paper we are using secondary type battery. It is rechargeable type. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current. There are two types of batteries, primary (disposable) and secondary (rechargeable), both of which convert chemical energy to electrical energy

Problem

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. But these renewable energy sources must have to be adopted in practical manner by keeping an eye on all aspects regarding the research work.

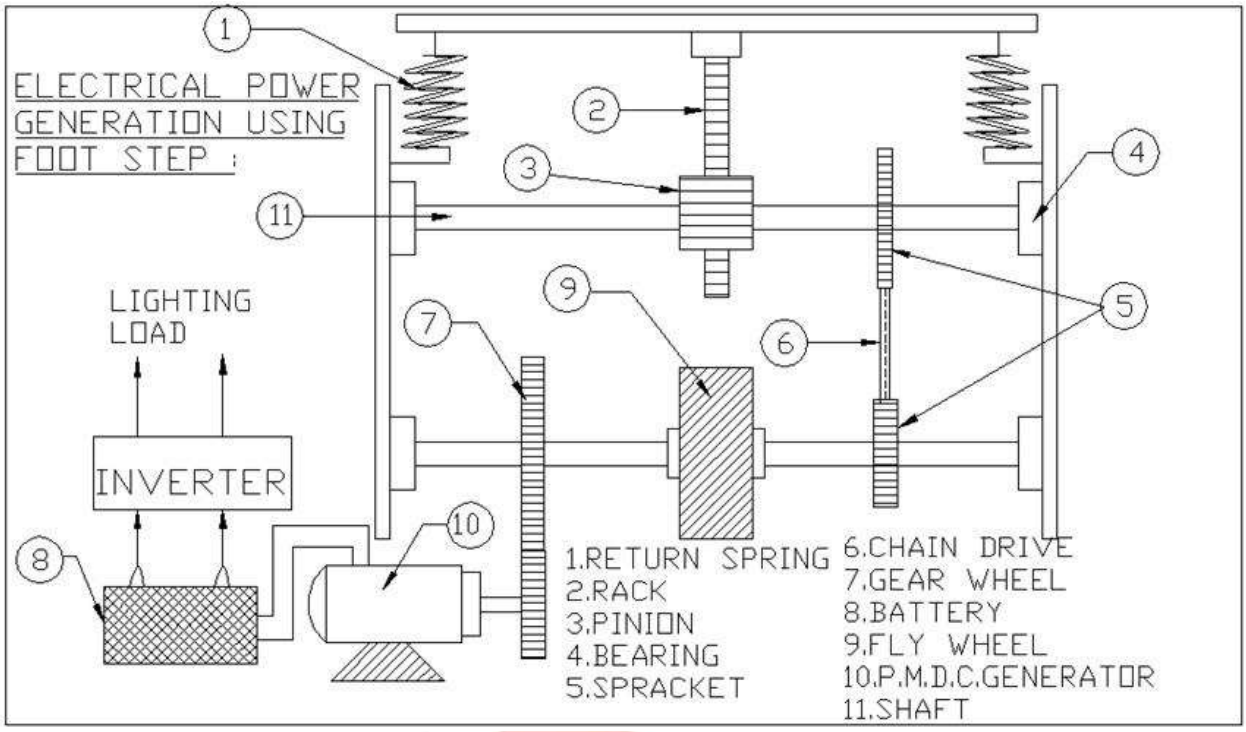
Problem Summary:

Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India where the railway station, temples etc., are overcrowded all round the clock .

Electricity is one of the daily requirement of life. It is required to increase as much as sources of renewable energy. This system can be used for utilization of waste energy of foot step to provide electricity during the cut-off of electricity in some places like gym or any crowded places. For example, there is cut-off of electricity because of that , gym members are not able to measure their weight on weighting scale and in the night , visibility is disappear due to cut-off of electricity. This system can be used with different techniques like use with weighting scale etc.

Working existing System:

- When force is applied on the plate by standing on 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 applied on the plate released the pinion reverses and moves another circle and cause rotation of gear pairs.
- piezoelectric crystal also get compressed and result in power generation.
- The generator attached to the last gear hence results in the dc power generator

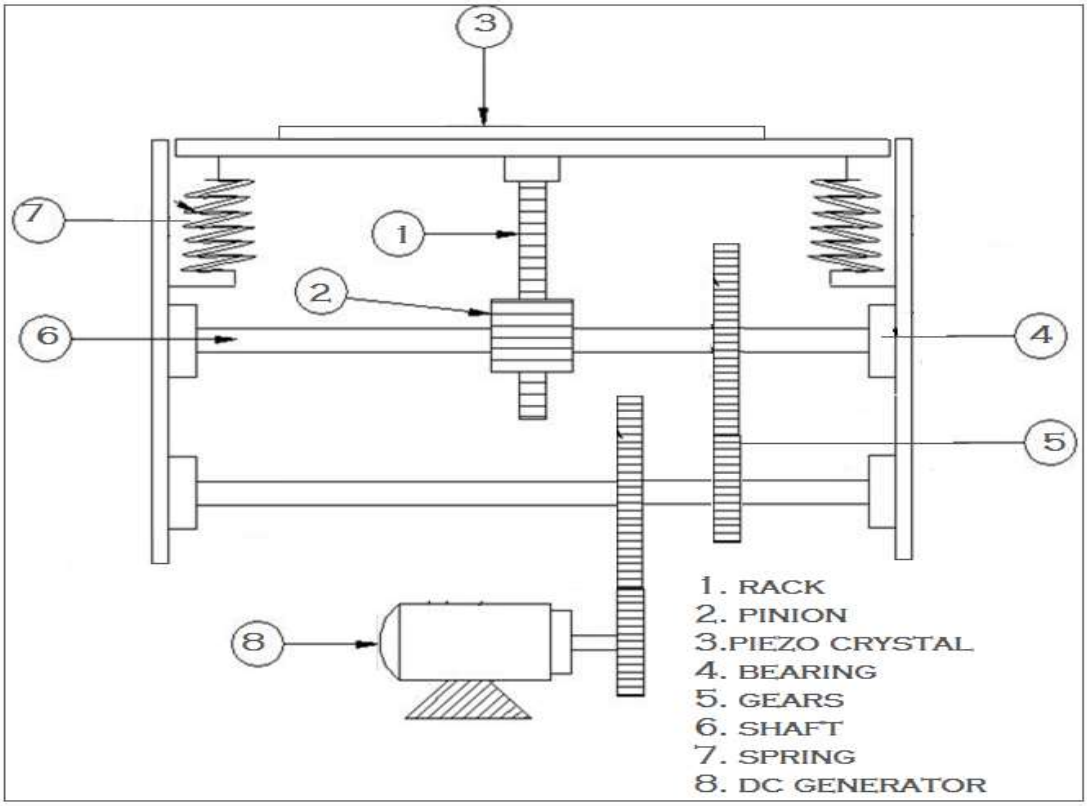


Line diagram of Foot step power generation system crystal

Objectives

- To generate the electricity through the human foot
- To provide electricity in rural area
- To promote the non-conventional energy source
- To save conventional energy sources
- To store the electricity for further use
- To produce electricity at cheapest cost
- To produced electricity from each piezoelectric crystal
- To produce electricity when rack move in upward direction
- To combine two method for more output from one system

Modified system



Line diagram of modified Foot step power generation system

Fig.: Final model

This is the line diagram of foot step power generator. It describe different components of the system in proper manner. In which rack moves downward as human weight applied which cause rotation of pinion on first shaft. A big gear is mounted with pinion on shaft one which is attached to the small gear of shaft two. Another big gear is mounted with small gear on shaft two which is in contact with gear of dc generator.

IMPLEMENTATION

For implementation we are going to install this system in weighting scale of the gym in which power will be generated during weight measuring by gym members .

- Implementation will be done after the modification of system by combining two methods that are rack and pinion arrangement system and piezoelectric crystals system to get maximum output of the system.
- When a person put step on the system power will be generated from the piezoelectric crystals will be stored in the battery simultaneously the rack will move down and make rotation of pinion and hence mechanical energy will be converted in to electrical energy by dc generator and after the modification power will be generated during upward movement of rack by the arrangement of ratchet mechanism inside the pinion and by using two rack and pinion.

CONCLUSION

Project work based on the idea of electric power generation without polluting the environment. The waste energy in form of human walking is utilized in the system. it is very useful at crowded places to install this system to produce electricity. New modified combine system gives more theoretical power output. This system is smother and less noisy in operation and provide flexibility in working. This system plays a important role for producing electricity at places where there are no sources of electricity like village areas. This energy source is renewable and continuous.

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