

Foot Step Power Generator

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Abstract— In present day, power has become the fundamental need for human life. The availability and its conjunction is regarded as the index of national standard of living in the present day of civilization. Energy is an important input in all sectors of any countries economy. The objective of this project is to design a setup that leads to generating electricity the energy which is going waste when human climb the stairs. This human energy is utilized and converted into electrical energy.

This generated energy is cost effective and non-hazardous for human. Power can be generated through stepping on the stairs, the generated power will be stored and can be used for domestic purpose. To obtain the above purpose, the experimental setup is designed which contains the flexible step, rack, spur gear, bearings, shaft, springs and dynamo. The working principle is based on law of energy i.e. mechanical energy is converted into electrical energy.

Index Terms: Pinion, Shaft, Generator, Helical gear.

INTRODUCTION

Now-a-days electricity has become the basic need of every human being. Electricity is used in each and every place. We cannot live without electricity. Electricity is used in day to day life, industries, transportation, etc. Now to fulfil this increasing demand of electricity, engineers are finding new ways to generate it. There are many places where there is no electricity .so we are generating electrical power by means of renewable energy, by simply walking on the footstep .non-renewable energy is very less so renewable energy is very much in demand now a days. As the availability of conventional energy declines, there is need to find alternate energy sources.

All most all the state electricity departments in our country, they are unable to supply the power according to the demand. The power produced by these companies is not even sufficient for domestic utilities; in such critical situation it is very difficult to

divert the energy for other public needs. New generation need electricity for each and every small appliance they use. Most of the energy is being wasted and exhausted, like humans bio energy is being wasted, so we can make it possible to use that energy in making a great invention. There by an alternative source must be discovered. Here we going to use renewable energy using footstep is converting mechanical energy into electrical energy. It is clear, safe, and free, does not pollute the environment and thus will be an extremely viable alternative in the days to come. As our population is increasing day by day the pedestrians are moving one after another continuously on the foot paths as well as in the cities, the footstep mechanism generates nonstop energy, which can be stored and utilized to energize the street lights. Here the concept is to convert the mechanical energy in to electric energy. Proposal for the utilization of waste energy of foot powerwith human locomotion is very much relevant and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock. This whole human/bio-energy being wasted if can be made possible for utilization it will be great invention and crowd energy farms will be very useful energy sources in crowded countries. Walking across a "Crowd Farm," floor, then, will be a fun for idle people who can improve their health by exercising in such farms with earning. The electrical energy generated at such farms will be useful for nearby applications.

LITERATURE REVIEW

In this project we are generating electrical energy by means of a nonconventional method just by walking on the footsteps. Non conventional system for energies is very much required at this time. Energy generation using footsteps requires no any fuel input

to generate electricity. In this project we are generating electricity just with the help of rack and pinion arrangement along with alternator and chain drive mechanism. For its proper functioning such that it converts Force into electrical energy, the mechanism consists of rack & pinion, chain drives, alternator and battery. We have discussed its various alternate applications with extension also. The power generation is much worthy but it has little initial cost effective factors Selection of Pneumatics. Power crisis is being one of the serious topics to be discussed. There for possible solution for this to provide sufficient amount of power using renewable energy.

DESCRIPTION OF EQUIPMENT

Rack and Pinion

Rack and pinion animations 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—the rack. Rotational motion applied to the pinion will cause the rack to move to the side, up to the limit of its travel. For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a rail car engages a rack between the rails and pulls a train along as steep slope.

Sheet Metal

Sheet metal is metal formed by an industrial process into thin, flat pieces. It is one of the fundamental forms used in metal working and it can be cut and bent into a variety of shapes. Countless everyday objects are fabricated from sheet metal. Thicknesses can vary significantly; extremely thin thicknesses are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate.

Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a rolls litter.

Spur Gear

A gear or cogwheel is a rotating machine part having cut like teeth, or cogs, 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. The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are called a gear train or a transmission. A gear can mesh with a linear toothed part, called a rack, producing translation instead of rotation.

Helical Spring

If we look at the free body diagram of the shaded region only (the cut section) then we shall see that at the cut section, vertical equilibrium of forces will give us force, F as indicated in the figure. This F is the shear force. The torque T , at the cut section and its direction is also marked in the figure. There is no horizontal force coming into the picture because externally there is no horizontal force present. So from the fundamental understanding of the free body diagram one can see that any section of the spring is experiencing a torque and a force. Shear force will always be associated with a bending moment. However, in an ideal situation, when force is acting at the centre of the circular spring and the coils of spring are almost parallel to each other, no bending moment would result at any section of the spring (no moment arm), except torsion and shear force. The will explain the fact stated below.

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. It achieves this by using at least three races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were sliding against each other.

DC Generator

A dc generator is an electrical machine which converts mechanical energy into direct current electricity. This energy conversion is based on the principle of production of dynamically induced emf.

Although a far greater percentage of the electrical machines in service are a.c. machines, the d.c. machines are of considerable industrial importance. The principal advantage of the d.c. machine, particularly the d.c. motor, is that it provides a fine control of speed. Such an advantage is not claimed by any a.c. motor. However, d.c. generators are not as common as they used to be, because direct current, when required, is mainly obtained from an a.c. supply by the use of rectifiers. Nevertheless, an understanding of d.c. generator is important because it represents a logical introduction to the behavior of d.c. motors. Indeed many d.c. motors in industry actually operate as d.c. generators for a brief period. In this chapter, we shall deal with various aspects of d.c. generators.

G.Metal Frame

The metal frame is generally made of mild steel bars for machining, suitable for lightly stressed components including studs, bolts, gears and shafts. It can be case-hardened to improve wear resistance. They are available in bright rounds, squares and flats, and hot rolled rounds.

WORKING PRINCIPLE

When the flexible step is activated by human power due to this it gets compressed and activates the rack to move down, this causes the pinion coupled to it to rotate. This action would make two end shafts to activate, the centre shaft get rotated with the help of spur gear arrangement. The activation of these three shaft tends to rotate the spur gear arrangement connected at its end. The obtained rotation is transferred to the generator with the help of gear arrangement, due to this electric power generation takes place and it is indicated by LED blinking and generated voltage level is monitored by multi meter.

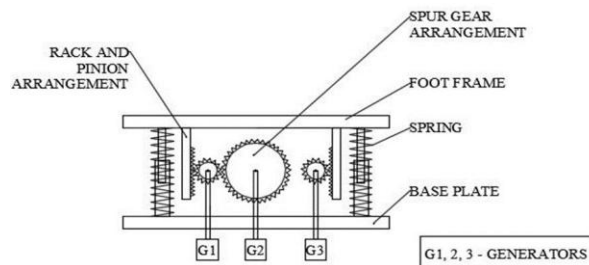


Fig.1.Working principle of Footstep power generation

MERITS AND DEMERITS

A. MERITS

- Power generation is simply walking on the step.
- Battery is used to store the generated power.
- Less moving parts.
- Easy maintainance.

B. DEMERITS

- Initial cost is high.

CONCLUSION

Energy is an important input to sustain industrial growth and standard of living of a country and can be directly related to energy consumption. The conventional sources energy like coal, oil, uraniumetc., are depleting very fast and by the turn of the century man will have to depend upon non-conventional sources of energy for power generation.

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