Design and Fabrication of foot step power generation using rack and pinion assembly

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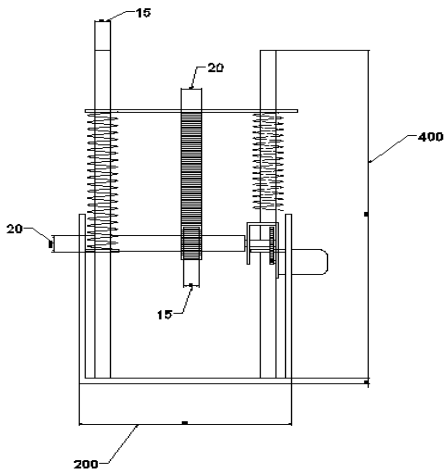
ABSTRACT - **In this project we are generating electrical power as non-conventional method by simply walking or running on the footsteps. Non-conventional energy system is very essential at this time to our nation. Nonconventional energy using foot step needs no fuel input power to generate the electrical power. In this project the simple drive mechanism such as rack and pinion assembly and chain drive is used for generating power by utilization of force which is obtained during the walking on steps is converted in to electrical energy with the help of mechanical systems. The generated power is stored by means of battery and this is used for activating the connected loads. This is one of the compact and efficient systems for generating electricity which can be easily installed in many regions.**

Key Words: ***Footsteps, Conventional Energy, Non-conventional energy system.***

INTRODUCTION

This manuscript describes about generating the power by using the weight energy, one can simply shocks by knowing how much energy a person can have by simply walking on the floor with a normal speed. As people's steps (thousands upon thousands a day) utilize and channel kinetic energy too .Whenever a person walks, manages to lose energy towards the floor by means of influence, vibration, and audio and so on, a result of the move of excess weight to the floor. That energy may be used and converted into power. The actual electro-kinetic floor is really an approach to making energy by using the kinetic energy of the person who walks on the floor.

The power floor is not like traditional floor. The energy produced by this floor will be environment friendly without having smog. Producing this type of energy will be cost effective also .The power floor does not need any fuel or perhaps any sort of energy resource, simply making use of kinetic energy. Based upon your excess weight from a person moving on the floor. In This Project We Are Generating 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 power Energy. By Using Simple Drive Mechanism Such As Rack And Pinion Assemble And Chain Drive Mechanism



RACK AND

Material - Mild steel

Function - To change the translator motion in to rotary motion

Properties -Strength, Rigidity, Resistance to shock loads, less wear and tear.

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move, thereby translating the rotational motion of the pinion into the linear motion of the rack.

SPRINGS

A spring is defined as an elastic body whose function is to distort when loaded and to recover its original shape when the load is removed The major stresses produced in helical springs are shear stresses due to twisting. The load applied is parallel to (or) along the axis. In open coiled helical springs the helix angle is large i.e., the spring wire coiled in such a way that there is no gap between two consecutive turns therefore application of these types is limited.

SHAFT:

A shaft is a rotating element, which is used to transmit power from one place to another. The power is delivered to the shaft by some tangential force and the resultant torque or tensional moment set up within the shaft permits the power to be transferred to various machines linked up to the shaft, in order to transfer the power from one shaft to another the various members such as pulleys, gears etc, are installed on it.

This member causes the shaft to bending. In other words we may say that a shaft is used for the transmission of torque and bending. The various members are mounted on the shaft by means of keys or splines. It is supported in between a two side plate by bearings Two gears are placed in the shaft. In this project the power is transferred from rack and pinion gear to shaft and another gear is placed in the shaft which having more number of teeth than pinion in the (rack and pinion arrangement).

SPUR GEAR:

Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with teeth projecting radially. Though the teeth are not straight-sided (but usually of special form to achieve a constant drive ratio, mainly involute but less commonly cycloidal), the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears mesh together correctly only if fitted to parallel shafts. No axial thrust is created by the tooth load.

DYNAMO

In electricity generation, an electric generator is a device that converts mechanical energy to electrical energy

Mechanical commutator. Also, converting alternating to direct current using power rectification devices (vacuum tube or more recently solid state) is effective and A generator forces electric current to flow through an external circuit. Here mechanical energy is torque of shaft. A dynamo is an electrical generator that produces direct current with the use of a commutator.

WORKING PRINCIPLE

The complete fabricated model picture of Foot Step is shown below. 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

Disadvantages

- Only applicable for the particular place.
- Mechanical moving parts is high
- Initial cost of this arrangement is high.
- Care should be taken for batteries

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

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, uranium etc.is depleting very fast and by the turn of the century man will have to depend upon non-conventional sources of energy for power generation**.** In concluding the words of our project, since the power generation using footstep get 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 kind of foot step which is used to generate the non-conventional energy like electricity .It is able to extend this project by using same arrangement and construct in the footsteps /speed breaker so that increase the power production rate by fixing school and colleges, highways etc.

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