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Fabrication of Power Generating Tiles

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Abstract: In this power generating tiles project we are making use of tiles to generate electricity. Generating off-grid electricity just by walking around or powering streetlights with your footsteps. Footstep power generation system is designed to be very useful at public places like railway stations where lot of people keep walking through all day. In the footstep power generation system Gear capture the mechanical energy produced by the kinetic energy and convert it into electrical charge with the help of the generators which in turn is used as a power source. Thus the gear and generators are used in flooring. The power source thus generated has a vast amount of applications in home application, agriculture, street lighting and as a energy source for sensors in remote locations.

Keywords: Rack and Pinion, Spring, Tiles, Generator, Electricity etc.

I. INTRODUCTION

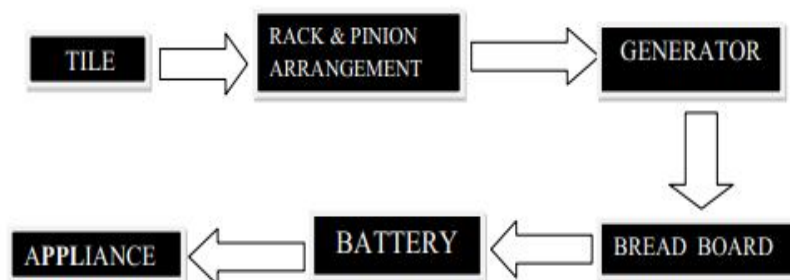
Now a days electricity is an important thing for human population. The demand of electricity is increasing every day. Meanwhile, electrical power has been used by various operation in the modern technology. The production of electricity leads to a huge amount of pollution. Now the gap between the demand and the supply of electricity made a path for the exploration of alternate sources of energy. The demand for the energy is increasing day by day as there is a tremendous increase in the human population. Since large amount of energy has been wasted, there is a need for the alternate power generation. This drawback has been removed with the help of the footstep power generation system. The main principle of this power generation technology is Gear mechanism and use of Generators. The Gear mechanism multiplies the displacement offered by the foot steps to the tiles and is used to operate the generator.

A. Mechanism Used

In power generating tiles we have proposed rack and pinion mechanism. Which converts the linear foot pressure into rotary motion. Due to which generator start rotating and electric voltage is produced by dynamically induced EMF.

B. Working Principle

First, a PVC base board of 14x14 sq. inches is taken. Between each edge of this tile, Rack and pinion arrangement is clamped along with a Generator. By this total of 4 sets is attached to the base board. For the top plate, Plyboard (1x1 sq. foot) is taken which is made like an open box from top so that it could cover whole working setup. After this Piston cylinder arrangement made of PVC pipe is incorporated on each corner to make the arrangement stable while applying the load over the top plate. Also a helical compression spring is placed in the centre of this whole setup, the spring makes the top plate returning back to its initial position when load is released from over it. The Generators are connected in series to a bread board circuit in which a LED is connected along with 8V lithium ion battery. The LED will get lighten up when load will be applied over the plate and also when it will be removed. The battery will store the Generated power. For the analysis purpose, Bread board circuit is also connected to a multimeter which will provide the power output from the setup.



II. COMPONENT USED

- A. Rack and Pinion Gear
- B. Generators
- C. Helical compression spring
- D. PVC Base Board
- E. PVC Pipes
- F. Multimeter
- G. Battery
- H. Ceramic Tiles
- I. Breadboard

III. SELECTION OF MATERIAL

In the context of product design, the main goal of material selection is to minimize cost while meeting product performance goals. Systematic selection of the best material (Table 1) for a given application begins with properties and costs of candidate materials.

Table 1

Parts	Materials
Base Board and Top Plate	PVC
Spring	Alloy Steel
Rack	Plastic
Pinion	Plastic

IV. PROCESS INVOLVED IN FABRICATION

A. Board

To sustain the force exerted by the footstep and making it economical, PVC material has been used for making the Baseboard and TOP PLATE over which force will be applied and over this Top plate a Ceramic Tile will be joined to give finishing.



B. Rack and Pinion

This type of gear is used to convert the linear applied force into Rotary motion of the generator. Rack and pinion are taken of plastic material to just explain the working of the mechanism by the prototype built. For the application in real life, mild steel or iron could be used.



C. Spring

For pushing back the Top plate back to its Initial position, Helical compression spring is used. While doing this the pinion also gets rotated in reverse direction making it more efficient to generating electricity in both direction of top plate movement. Alloy steel is used for the spring material as its has High performance due to corrosion resistance , high durability, high strength to weight ratio.



V. CONCLUSIONS

Using Rack and pinion arrangement along with use of generator is one of the most Efficient conventional way of generating the Energy. By this, electricity shortage problem could be solved as this method generates sufficient amount of energy to light up LED's and charge our Electronic devices.

A. Result

In power generating tiles, as output we are getting electricity from the generators. The current output is about 8-10V and power generated is approximately 2 Watt.

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