

FOOT STEP POWER GENERATION

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Abstract - In this paper, we are generated power by simply walking on floor for power applications. Today the basic need of human is electricity. The energy obtain from floor is one of the non-conventional energy. In India mostly energy is generated by using conventional energy sources and they are very much limited. On the other hand by using such resources may cause global warming and serious pollution. Hence it is necessary to use non-conventional energy to generate power which is eco-friendly and clean in nature. This system harvest electricity using the pressure energy from movement of human through the floor. It is electro-mechanical system. This mechanism contains the rack and pinion, gears, bearing, chain, ratchet mechanism, sprockets, dynamo and battery. The main aim of this system is the harvesting large amount of power from overcrowded places which can be utilize during load shedding and we are trying to reduce the problem of electricity in our country significantly.

Key Words: Energy, Non-conventional, Chain, Gear, Sprockets.

1. INTRODUCTION

In India, there are several hours of daily power-cuts in rural areas as well as in urban areas like metro cities due to the increase in demand of electricity. As result, people in our country are forced to use rechargeable batteries or a diesel/petrol-run electric generator during such condition. The use of generators is common in industries but it is unusual to utilize it at home. Because of the cost to run the diesel/petrol-run electric generator is high. Besides, it also causes pollution which increases global warming. So the proposed method which can be a help in smaller scale to save the power in the urban areas like metro cities and the power saved by this method can be used to light up the rural areas. In the future, there are chances of having more number of methods available to produce the electricity by non conventional method. The technology is concentrated on the increasing the efficiency of the equipment used for the non conventional method power generation. Increasing the efficiency induce the increase in the amount of generating electricity with the same or less amount of input energy that is used prior. To develop a method which is economically suitable for the mass production of the power generation by non conventional method is a challenge.

In the past, several substitutions were proposed for generating electricity at the smaller scale. Here using the mechanism of rack and pinion where power generation takes place with the use of mechanism that generates the

power from the energy force of the people produced by walking or dancing on the floor. This technique can be used in the areas where consumption is high such as city areas.

This method of electricity generation can be divided into two parts. First, the conversion of waste energy that is produced by human into useful mechanical energy and then the mechanical energy into electrical energy. The pressure energy that is produced due to the walking or dancing on the floor is converted into mechanical energy by using of rack and pinion mechanism.

Then generated rotational/mechanical energy is used to produce electric power by using dynamo. In the first part of energy conversion, the pressure energy generated by the walking or dancing on the floor by the people is converted into vertical motion of the dance floor with the help of the springs and there is a rack fixed to the floor, which helps to convert the vertical linear motion into the rotational motion with the assistance of pinion attached to it.

Furthermore, this mechanical energy is transferred to the dynamo with the help of speed increasing gears and ratchet mechanism and the dynamo is used to generate the power. The total power generated by the mechanism depends on the number of rack and pinion mechanism used and the quantity and type of dynamo taken in use. There is a battery provided for the storage of the power. In this, 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.

2. BLOCK DIAGRAM

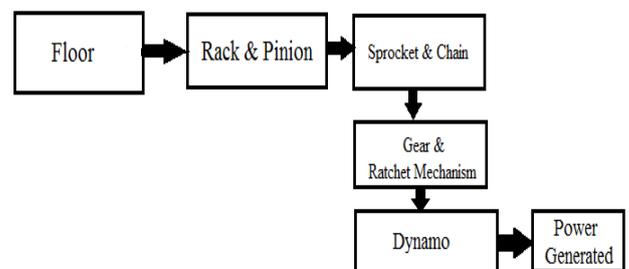


Fig.-1 Block Diagram of Generation of Power Using Floor

2.1 HARDWARE DESCRIPTION

i) Shaft

A shaft is a rotating machine element which is used transfer power from one place to another. The shaft clamped between the iron frame works and the freewheeling type bearing attached to the shaft. The freewheeling bearing rotates only in on direction.

ii) Rack and Pinion

A circular gear is called pinion which engages teeth on linear gear bar called rack. This part is attached with the bottom plate. When force applied on floor rack moves downward and convert linear motion into rotational motion.

iii) Chain Drive

Chain drive is used for transmitting mechanical power from one place to another place. It is often used to convey power to the wheel of vehicle. The power is transmitted by roller chain, known as the chain drive.

iv) Gear Mechanism

This mechanism can be used in many different forms. The arrangement used for device is attached with the help of sprocket arrangement. There is smaller output shaft in this mechanism which converts the total applied force into the rotational force.

v) Sprocket

Sprocket are used in bicycles, motorcycles, cars, tracked vehicles and other machinery to transmit rotary motion between two shafts where gears are unsuitable or to a track. They can be run at high speed and some forms of chain are so contracted as to be noiseless even at high speed.

vi) Spring

It is defined as an elastic body whose function is to distort when loaded and to recover its original shape when load is removed. It absorbs or control energy either due to shocks or due to vibrations.

vii) Dynamo

Dynamo is device which is used to convert the rotational energy into electrical energy. The current produced by dynamo is DC. It is primary form of power generation due to its reliability and efficiency of the system.

viii) Battery

A 12 volt lead acid battery is used to store the generated electrical power. Lead acid batteries are the most

common in system because there initial cost is lower and because they are readily available nearly everywhere in the world.

3. CIRCUIT DIAGRAM

- 1) Spring
- 2) Rack
- 3) Pinion
- 4) Bearing
- 5) Sprocket
- 6) Chain Drive
- 7) Gear
- 8) Ratchet
- 9) Dynamo
- 10) Shaft

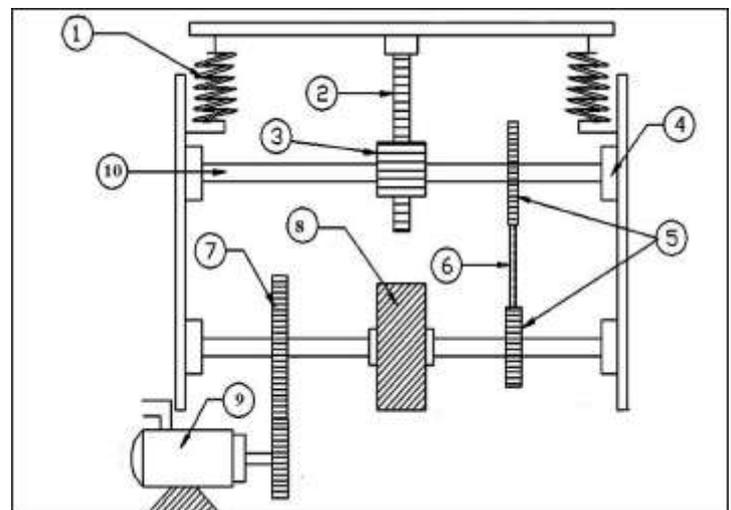


Fig.-2.Circuit for Generation of Power Using Floor

3. PROPOSED SYSTEM

This system contains rack & pinion, springs, chain, ratchet mechanism, sprockets, dynamo, battery, etc. which are fixed below the floor. Four spring are used at each end which is use to regain the original position when pressure is released. The rack is fixed with floor and coupled with pinion. Rack & pinion is use to convert linear motion into rotational motion. When force applied on floor the rotational motion from the shaft of rack given to the sprocket. The rotational motion from lager sprocket is given to the smaller one and they are coupled with each other with the help of chain. The gear system is provided to increase the rotation. The smaller sprocket is running is same direction for the forward and reverse direction of rotational movement of the lager sprocket with the same speed. The rotational motion is given to the dynamo which generates power then it is stored in battery. Here the chain drive is rotate only in forward direction. Thus mechanical energy is converted into electrical energy and use for various applications.

4. CONCLUSION

In proposed system of power generation there is no any fuel input requirement for the generation of electrical power. Thus it can also be concluded that this mode of power generation system is eco-friendly, i.e. no pollution is caused during the generation of power using this type of model. Hence due to such advantages, this system can be embedded at any of the public places like railway platforms, busy foot-paths, malls etc.

Implementing this system, dependency on the conventional sources of energy can be reduced, thus it is considered as beneficial for nature and human life.

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REFERENCES

- 1) Abhishek N, Shivasharana Yalag, "Power Generation by Foot Steps Using Rack and Pinion Arrangement", International Journal of Engineering Research and Advanced Technology, volume 02 Issue 01, pp 2454-6135 2016.
- 2) Joydev Ghosh, Supratim Sen, Amit Saha, Samir Basak, "Electrical Power Generation Using Foot Step for Urban Area Energy Applications", International Conference on Advances in Computing, Communications and Informatics, 2013 IEEE.
- 3) M. ISWARYA, G. R. P. Lakshmi, "Generation of Electricity by Using Speed Breakers", IEEE International Conference on Power, Control, Signals and Instrumentation Engineering, IEEE 2017.
- 4) N. S. Metalia, D. Khandwala, "Power Generation from Dance Floor", International Journal of Engineering Research and Technology, Volume 06 Issue 04, pp 853-856 April-2017.
- 5) Rajesh Kumar Datta, Sazid Rahman, "Power Generating Slabs: Lost Energy Conversion of Human Locomotive Force into Electrical Energy", 8th International Conference on Electrical and Computer Engineering, 20-22 December, 2014, Dhaka, Bangladesh.
- 6) Rajesh Kannan Megalingam, Lekshmi M. Nair, Meera Viswanath, Shreeja Sugathan, "Pedalite: Lighting Up Lives in Un-electrified Villages", IEEE Global Humanitarian Technology Conference, IEEE 2012.
- 7) S. M. Shyni, R. Manasa Veena, B. Harika Reddy, "Maximum Energy Harvesting from Electrimagnetic Micro Generators by Footsteps Using Photo Sensor", International Conference on Computation of Power, Energy Information and Communication, IEEE 2016.
- 8) Sabarish R, Alok Kumar, "Design and Fabrication of Foot Step Power Generation", International Journal of Pure and Applied Mathematics, Volume 116 No. 19 2017, pp. 529-533.