

ENERGY GENERATION from PENDULUM: a REVIEW

Dr. S.M Mowade¹Shubham Tiwari²,Shree Chimantrawar³,Nihal Shendre⁴,
,Atul G. Thaware⁵

2,3,4(Mechanical, RTMNU, Smt. Radhikataipandav college of Engg. ,Nagpur .

Email: st85955@gmail.com, iamshree111@gmail.com, nihalshendre@gmail.com)

1. Prof.& HOD, Dean of Mechanical Engineering department , RTMNU, Smt. Radhikatai pandav college of Engineering. ,Nagpur .

Email:sanjaymwd@gmail.com)

5(Asst.Prof., Mechanical Engineering department, RTMNU, Smt. Radhikataipandav college of Engineering. ,Nagpur .

Email:atulthaware15@gmail.com)

Abstract:Man has been always curious regarding study of energy and developing it for his betterment and comfortness. The small investors and designers are focusing on developing more renewable sources of energy which requires less input for improvement of human conditions. This paper is about studying different systems for producing electrical energy from pendulum. We are reviewing the research works done by other researchers on this subject. The reason behind studying this energy extraction from pendulum is to check whether it is possible to develop the energy from oscillating pendulum or not.

Keywords — electrical energy, pendulum, oscillation.

INTRODUCTION

The study of energy is enormous. The need for energy is increasing day-by-day. It is very important to produce more energy producing systems as per the increasing need. Electrical energy is used for running different machines. Today human is surrounded by all this machines which uses electrical energy as their input source. The electrical energy is produced with the help of various renewable and non-renewable sources. We need to use more renewable sources of energy for developing electrical energy. Some of the non-renewable sources of energy are going to diminish. In some sources of electricity generation, the by-products produced during generation of electrical energy are harming our atmosphere. So, we also need to focus on eco-friendly system for electricity production.

A pendulum is simple in construction and also eco-friendly. The principle of pendulum is that when it is suspended by a certain degree of angle so that it can oscillate freely, a recovery force is subjected to it due to gravity that it will accelerate back to its equilibrium position. Hence, we align ourselves on system, which produces electrical energy from pendulum with less input.

LITERATURE REVIEW

M.Musharraf et.al worked on design of an oscillating coil pendulum to generate energy. In this paper, author has

focused on generating energy by using wind blowing power. Here, two types of models are discussed.

Type1: wing oscillating coil pendulum generator.

Type2: wing oscillating coil pendulum generator by using magnet bar.

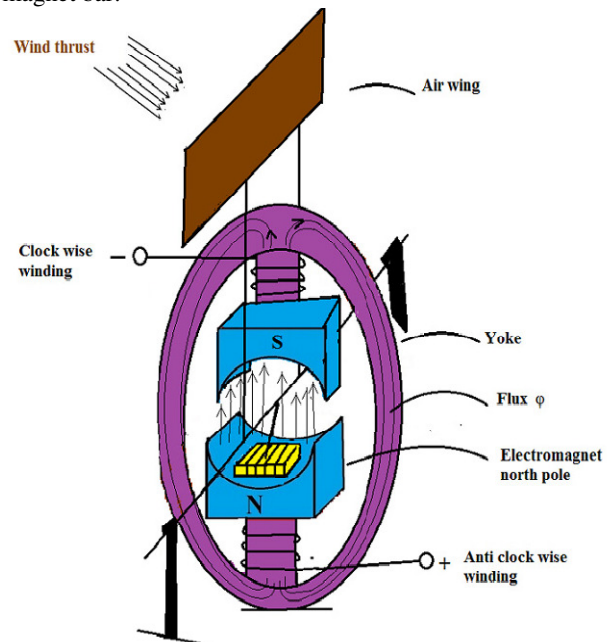


Fig. 1. (a) Type-1: Wing oscillating coil pendulum generator.

In type1; the north pole of semi-circle magnet is placed under coil pendulum and the south pole of the semicircle of magnet is placed above the coil pendulum.

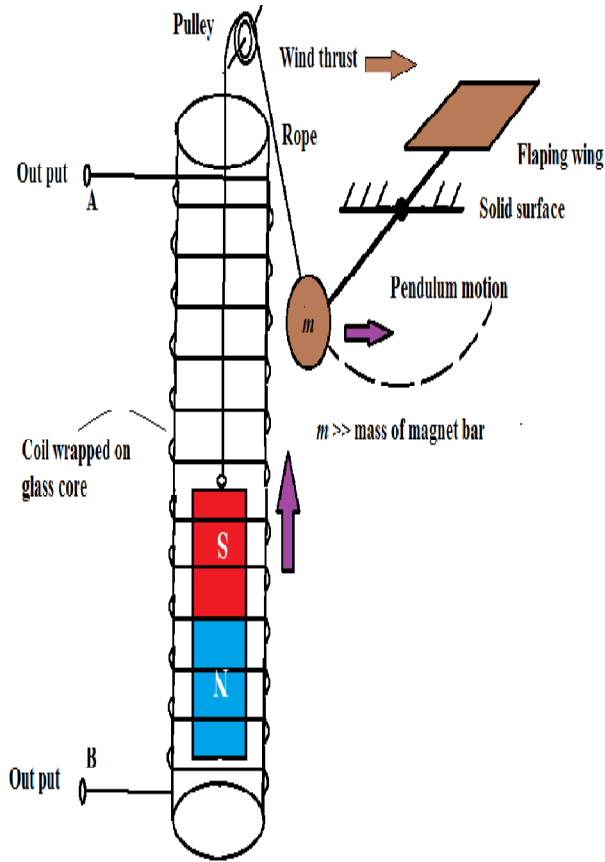


Fig1(b) Type-2: Wing oscillating coil pendulum creator by using crowd-puller bar.

The Department of Type2, a bar magnet is placed in a copper wire coil, which is packaged in a glass core. A bar magnet to the pendulum. This pendulum has a bob of mass 'm' [1]. The author has used the principle of faraday's law to generate energy from oscillating pendulum. The faraday's law states that, when a coils of conductor moves under the effect of magnetic field then magnetic lines either cut the turns of coil or conversely. When the magnet moves in the conductor coil, the electric power is generated in the coil.

From this paper we have got a new way to obtain energy from oscillating pendulum. The use of magnet and pendulum may generate energy more effectively.

S. Nithiya et al. Has developed an energy harvesting system using pendulum which is cheap and eco-friendly. In this some of the kinetic energy developed in pendulum is used for producing electrical energy [2]. In this paper the author has proposed low maintenance system which provides voltage output peaks from a reciprocating mechanical structure.

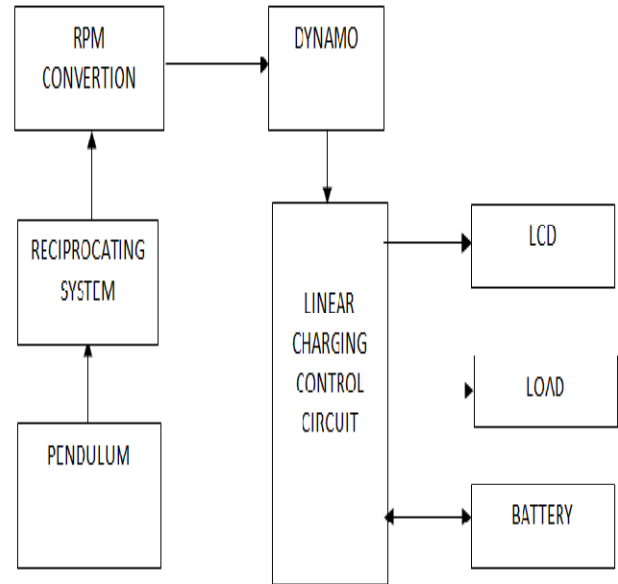
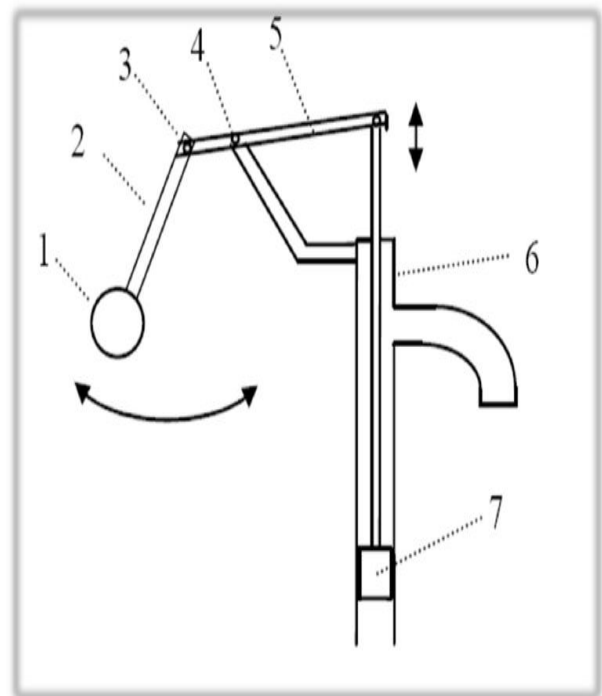


Figure:2 Proposed system block diagram of energy harvesting using oscillating pendulum.



The above diagram shows the construction of the system developed by author. In which oscillating motion is converted into reciprocating motion, and then this motion is used to generate electrical energy through dynamo. The main concept of this paper is, Socket ball concept invented in the Chicago in (2010). The Pendulum system setup is made inside the Socket ball, i.e. whenever we apply force on pendulum the kinetic energy of ball makes the pendulum to oscillate which cuts the electromagnetic field, and generates the electrical energy. Thus the electrical energy obtained will power up the LED and stored in the battery for further usage.

Anuraganand et al. has discussed the system of a pendulum pump which is used as a supplementary device for pumping water. The important principle of a pendulum pump is that the work is alleviated or in simple terms it makes work rather easier when is compared with a traditional hand water pump. The result of pendulum function, which allows the pump to be used as effective mode when irrigation of smaller stacks, water-wells and can also be used in extinction fires even by old persons and children.

Fig:3(a) Block diagram of pendulum pump

The use of a pendulum-based water system can increase the efficiency of the system and reduce the effort [3].

In this system pendulum is attached to the lever of pendulum pump. There are two leg-lever and cylinder with piston in the system. Oscillation period of the pendulum is twice bigger than the period of the lever oscillation.



Fig: 3(b) CAD model of Pendulum pump

Damping of the pendulum occurs due to the damping of lever, but the work of the forces which damp the lever is greater than the work of the force damping the pendulum.

Oscillation lever and pendulum takes place in the same plane, vertical in relation to Earth. The pendulum is a vertical equilibrium position and equilibrium position the lever is horizontal. The proposal of this work is that the initiation of energy to start the process of pumping, a swinging pendulum, and significantly in comparison with the Minimum work required to operate hand pumps. This system requires less initial power to operate the pendulum.

P Duclos was worked to produce this product, where they produced electricity. This invention relates to the pendulum in the mechanism and power plants of electric power system with a pendulum. The present invention relates to a method and mechanism for the conversion of gravity in the rotation movement to actuate the device as a generator. With at least one pendulum consists of a free mass to the pendulum over the back axes and movers for applying force to mass in the direction of the pendulum back and forth for at least part of the swing drive belt train between at least one pendulum and Generator for power transmission between the pendulum and generator[4].

Michal Marszal et al. In this paper, the writer analyzes the possibility of exploitation of energy from vibrations on the environment. Tests are being carried out experimental platform, which consists of reported forced pendulum and energy harvester, and exploitation of energy is possible and more effective [5]. The system of physical pendulum excited vertically reviewed, as evidence of the possible harvesting of oscillation of a pendulum. Basic use of the striker is to measure the time. Utilization of energy from a rotating motion of the pendulum is prone to stochastic wave magnetization.

MithunGajbhiye et al. in this paper the author proposed about pendulum that pendulum is a weight suspended from pivot pin, so that it can oscillate freely. And in a vibrant position, i.e. when the pendulum is moved from the position of its holiday, it is balanced, so it is due to the seriousness of the recovery of the force. And the time for complete one cycle of pendulum is swinging of pendulum from left side to right side. and is called the time period of pendulum[6].

The time phase depends on the extent of the pendulum.

$$T=2\pi\sqrt{\frac{l}{g}}$$

Where “L” is length of the pendulum and “g” is the increase of velocity due to magnitude.

The forces produced by the pendulum have two kinds of force in the pendulum movement. A force of gravity, Bob has a tight downward effect

The other is a strain that directly acts on the pivot pins of the pendulum swinging upside down.

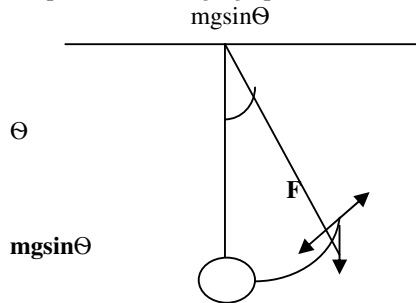


Figure:4 Force generated by pendulum

ADVANTAGES

- i. It can be used in remote areas the power supply is not available.
- ii. Does not require management costs because it does not require fuel.
- iii. It can be installed anywhere quickly as it compares to solar, wind and other type of plant.
- iv. It is simple in the building as the other conventional part.
- v. Required less preservation than other command station.

CONCLUSION

After reviewing all the above paper, it is conclude that it is possible to generate electricity from pendulum with less input. So above literature shows various pendulum mechanism for the electricity generation and some other application which further has a scope of improvement, so this review of the energy generation using pendulum can be useful for further development in mechanical system ,Design engineering and for the researchers With the demand for energy needs that increase enormously, it can be satisfied by alternative energy resources such as gravity.

REFERENCE

- i. M. Musharrafa, I. U. Khanb, *Design of an Oscillating Coil Pendulum Energy Generating System*
The 4th International Conference on Sustainable Energy Information Technology (SEIT-2014)
- ii. S.Nithiya, K.Sadhuna,A.saravanan,*Energy Harvesting using oscillating pendulum,ISSN:2279-0500*
- iii. AnuragAnand, DevanshuJhokal, Rahul Sharma, RupeshDeshbhratar.
Fabrication of Pendulum Pump,
International Journal of Scientific & Engineering Research, Volume 8, Issue 2, February-2017 ISSN 2229-5518
- iv. P Duclos, lles De La Madeleine,
PendulumMechanism And Power Generation System Using Pub. No.: US 2010/0148517 A1 ,
Pub. Date: Jun. 17, 2010
- v. MichałMarszał, BłażejWitkowski, *Energy harvesting from pendulum oscillations*
International Journal of Non-Linear Mechanics.
- vi. Mithungajbiye,mayuriboke,akshaykelwadkar,*Ener gy harvesting by using pendulum power generator.International research journal of engineering and technology/Feb-2016,ISSN:2395-0056*