

Potential of swing energy

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Abstract—This paper presents the utilisation of gravitational potential energy of garden swing for various day to day useful purposes. Energy can be created while kids are enjoying their play time on swing .This energy created can be utilized for various purpose like lifting water, generating electricity. This type of energy created is renewable and clean with no harm to environment.

Keywords- Gravitational potential energy (GPE), kinetic energy

I. INTRODUCTION

Swing is the most loved and interesting tool than kids like to play in garden or any amusement park. For the enjoyment of kids there are various type of swing made for thrill and excitement. Basically swing consist of frame like structure with a shaft placed vertically and long rod ended with a seat on which the child can sit.

Swing basically works on principal of pendulum; its swing action is similar to that of pendulum. The conversion of potential energy into kinetic energy and vice versa is the basic principal of swing. The conservation of momentum leads to creation of energy. The oscillatory motion of the swing is converted to rotary motion at shaft, this rotary can used to lift water or generate electricity with the help of belt drive, chaindrivegear.

Fig- child playing on swing



Swing energy generated is renewable and pollution free hence it reduces burden of non-renewable source of energy.

A. ENERGY AND ECOLOGY

In recent years, global warming has brought climatic changes on the earth. This undesirable impact of environment can reduced substantially by replacing thermal power plants by the alternative sources of energy generation and if vehicular transport is run on electricity thereby reducing co2 emission. And batteries as portable sources of energy are the first choice when it comes to switching to electrical means to transport. A battery run pulsed linear motor and its electronic control system had been developed at NRL-Srinagar, Kashmir in 70's. Later, the same electronic control system was used to develop a moving magnet rotational motor called 'A Battery-Run Pulsed motor with inherent dynamic electric switch control. It is well know that ferrite field dc motors are highest efficiency motors. Rare earth magnet system, combined with above mentioned motor can be developed into a variety of power and highest efficiency motors .

It is common knowledge that electrically –run vehicle system were being made even in the middle of nineteenth result were dismissed .they could not compete with gasoline cars, which had greater range, speed, mobility and lees cost. Lead acid battery continues to be the lowest cost battery even today in spite of new type of batteries being developed.

One litre of modern lead acid battery weighing 2.4kg contains 0.07 kWh power and can propel a passenger a few hundred meters. By comparison, one litre of petrol weighing 0.85 kg contains 11kwh and can drive a vehicle 10 km.

This is far greater than that of battery, in traction application and is 100 times lighter and takes 40 times less space. But with new development in pipe line such as ALABC of US, and interest of other countries such as Australia, UK and India, it is expected that soon new generation of lead/acid batteries with higher specify energy longer life and lower cost hitherto will be developed. Moreover, other battery system is also coming up.

B. RENEWABLE ENERGY SOURCE

The potential of renewable energy sources is enormous as they can in principal meet many times the

world's energy demand. Renewable energy sources such as biomass, wind, solar, hydropower and geothermal can provide sustainable energy service, based on the use of routinely available indigenous resources. A transition to renewables-based energy system is looking increasingly likely as their cost declines while the price of oil and gas continues to fluctuate. In the past 30 years solar and wind power systems have experienced rapid sales growth, declining capital cost of electricity generated and have continued to improve their performance characteristics. In fact, fossil fuel and renewable energy prices, and social and environmental costs are heading in opposite directions and the economic and policy mechanisms needed to support the widespread dissemination and sustainable markets for renewable energy systems are rapidly evolving. It is becoming clear that future growth in the energy sector will be primarily in the new regime of renewable energy, and to some extent natural gas-based systems, not in conventional oil and coal sources because of these developments market opportunity now exists to both innovate and to take advantage of emerging markets to promote renewable energy technologies, with the additional assistance of governmental and popular sentiment. The development and use of renewable energy sources can enhance diversity in energy supply markets, contribute to secure long-term sustainable energy supplies, help reduce local and global atmospheric emissions, and provide commercially attractive options to meet specific energy service needs, particularly in developing countries and rural areas helping to create new employment opportunities there.

C. IMPORTANCE OF RENEWABLE ENERGY

Alternative sources of energy have become very important and relevant to today's world. These sources, such as sun, wind, water etc. can never be exhausted and therefore are called renewable and are available locally. This benefits climate protection, because 53 million tons of emissions of the greenhouse gas carbon dioxide are avoided where energy is produced. Their use, to a large extent, also reduces chemical, radioactive, and thermal pollution. Thus, these sources stand out as a viable source of clean and limitless energy.

II. WORKING

The working principle is the same as that of the simple pendulum. In a swing, the heavy mass bob is replaced by a swing and a person sitting on it. It obeys the law of conservation of energy. The one form of energy is converted into another and vice versa, i.e., the potential energy at the top position is converted into kinetic energy at the bottom position and vice versa. The gravitational potential energy is maximum at the top and nil at the point where kinetic energy is maximum. The total of both the energies at any point is the same for all points, hence the conversion of energy takes place which is responsible for the working of a swing.

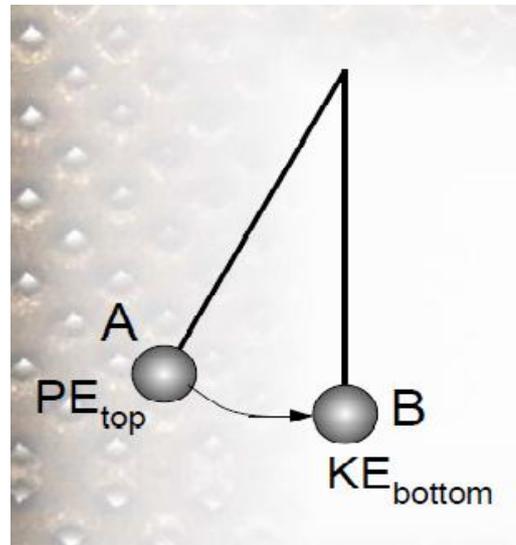


Fig. working of pendulum

III. APPLICATION

Application of a swing can be done in various day-to-day work of individuals for those common purposes where we waste a lot of energy or power. If the oscillatory motion of the swing is converted efficiently into rotary motion with the help of gears, belts, and pulleys or some linkages, then this swing can be used for a variety of useful purposes.



Fig- swing model for generating electricity

1. The rotary motion thus obtained can be used for generating electricity by the help of a generator, as the rotary motion to a rotor is given by some gearing mechanism.
2. The rotary motion is given to a pump which helps in lifting of water, which can be used for various domestic and agricultural purposes.
3. If some proper linkages are attached to a swing, it helps in pumping of hand pumps, which saves a lot of time and energy of rural women in developing countries.

4. Thus if proper utilization of rotary motion is done the gravitational potential of swing energy can be used in various useful ways.

- **ADVANTAGES**

- Free energy generation during relaxing, lighting the area.
- Helps in relaxing in the garden which improves the comfort and confidence.
- Increase blood circulation.
- Power generation through normal relaxing on the chair and swinging and for doing so, no recurring expenses, comparatively for other type of energy generations recurring expenses are incurred per unit.
- Maintenance will be negligible, only lubricating the piston rod and the rotary parts.
- Such tiny units for electricity producing will cater the individual electricity needs which make them self-reliant and not depending on the government electricity board.
- More electricity can be generated by the proper designing of generator and storage capacity of the battery.
- While relaxing we can also water the garden plants

IV. CONCLUSION

In this paper we have studied the potential of gravitational potential energy of swing and its utilization in various fields. This form of energy is clean and renewable hence has a great scope of development in future. New and efficient ways to utilize such form of energy must be made which will lead to clean environment and would not harness those polluting, non-renewable sources of energy.

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