

“ELECTRICITY GENERATION AND BOTTLE CRUSHING BY USING SWING”

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ABSTRACT

This paper tells us about how we can convert pendulum motion of swing into electrical energy. Swing is generally used by children for playing in parks & playgrounds that will produce electricity during its use. During swinging pendulum motion of shaft transfers its motion to flywheel. This rotary motion of flywheel is transferred to low RPM generator which generates electricity in small scale. On the other side of shaft crushing mechanism is connected, which can be used to crush plastic waste collected in the park or playground.

Key-words: Bearing, flywheel, generator, pendulum, shaft.

1. INTRODUCTION

Energy is the ability to do work. Energy is need of today's world. Need of energy is increased due to increase in populations. This paper tells about electric energy produces by swing used in parks & playgrounds. The electrical energy can be used for many applications for domestic appliances. Energy produced does not cost any money and is ecologically friendlier. This method of producing electricity can be implemented at various parks, schools play houses etc. this will help in saving electricity. The main reason for such a high power demand is because of lack of improper energy use and conservation. It would also reduce environmental pollution such as air pollution caused by burning of fossil fuels and improve public health, reduce premature mortalities due to pollution and save associated health costs. Normally plastic waste is collected in large amount in parks. If this waste is to send to recycling it will require more space & transportation cost will be high. If this plastic wastes is crushed before sending to recycle, it will reduced storage space & transportation cost. Hence crushing mechanism is attached on the other side of shaft.

2. FUNCTIONAL DETAILS OF STRUCTURE

2.1. Components

Various components are used in the structure such as supporting frame, shaft, bearings, pulley, belt for belt drive, low power electricity generator, links for slider crank mechanism, and ram for crushing.

2.1.1. Supporting frame

It is a metallic material frame of 6 feet height and 4 feet length to support the seating arrangement which acts as pendulum while in operation. It is well fixed with nut and bolts to the base which is made up of wooden or metallic board. At the centre of the supporting frame, seating arrangement is attached. The bearings are provided on both the side for the smooth motion.

2.1.2. Shaft

Here shaft is not subjected to large speeds such as electric motors and IC engine hence we are using mild steel as materials.

2.1.3. Bearings

The most common material used to produce load carrying components in a precision ball bearing, roller bearing, and taper roller bearing is 52100 chrome steel. These components are bearing inner and outer rings, balls and roller. The typical surface hardness for bearing components made from these material ranges from 60 to 64 on Rockwell hardness scale (RC).

2.1.4. Freewheel

Freewheel is used to transfer rotary motion to low RPM generator. Freewheel is made up of mild steel.

2.1.5. Belt

Belt is loop of flexible material use to link two or more rotating shafts mechanically most often parallel. Belts are looped over pulleys and may have twist in between. Generally belts are made up of rubber.

2.1.6. Low RPM generator

Low rpm generator produce power at low revolution per minute. Low rpm generators once employed provides years of usage. These generators not only provide higher efficiency but also have low cost. Low rpm generator are used because it gives a highly reliable power output as they work at less speed with less wear and tear of the various part of generators. A low rpm generator to convert mechanical energy into electrical energy is used.

2.1.7. Links

Linkages are elements are used to transfer motion between two elements. It is made up of Mild Steel.

2.1.8. Ram

Ram acts as actuator in crushing mechanism. It is used for crushing of plastic bottles. These are flat rectangular or cylindrical Mild steel bar.

2.2. Construction

This project is related to generation of electricity by using swing and bottle crushing, by playing swing set in the park, play house, school, nursery, etc. Seating arrangement of swing is rigidly attached to the shaft by welding. This shaft is supported by bearings at the ends of frame. At the one end of shaft outside the frame a pulley is connected which will be driven by shaft during swinging. This motion of freewheel is transferred to a small capacity generator which generates voltage. At other end of the shaft slider crank mechanism is used to transfer to and fro motion to the crushing plates for bottle crushing application.

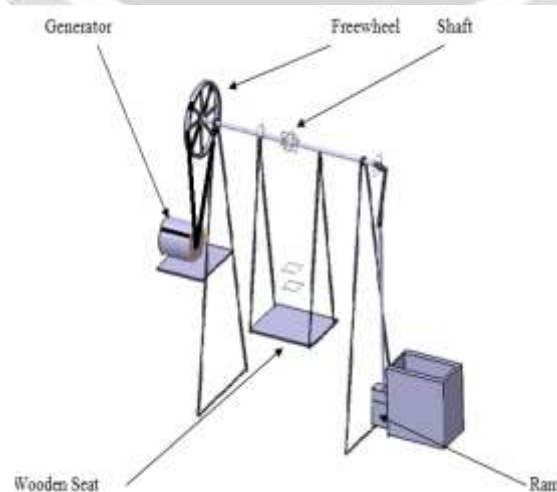


Fig.1. Structural setup for electricity generation and bottle crushing by using swing

2.3. Working

During the forward stroke & backward stroke of swing some torque is induced in shaft. The shaft is mounted between two bearings. At one end of the shaft, freewheel is mounted on axle. When the seating of the swing set moves forward & backward some torque is induced in the shaft by the holding bars of swing set. This torque displaces freewheel which is pivoted over axis of shaft causing the angular displacement. Rotary motion of freewheel is transferred to generator thus producing the electricity. Freewheel is used to smoothen the flow of energy as the power is produced in alternate stroke. The electricity thus produced is stored in a battery by using electric circuits.

3. ADVANTAGES, LIMITATIONS & APPLICATIONS

3.1. Advantages

1. Electricity generated is pollution free.
2. Easy installation and maintenance
3. Simple mechanism.
4. Power generated can be stored in battery.
5. Can be installed at places such as playgrounds, schools.

3.2. Limitations

1. Power generation is not continuous.
2. Implementation cost is little bit higher than overall average production cost.
3. Periodic checkups required.

3.3. Applications

The system can be implemented in places such as,

1. Schools
2. Playgrounds
3. Parks
4. Nurseries
5. Gardens

4. CONCLUSION

- The proposed system offers an innovative method to generate electricity from the mechanical energy produced during the swinging action of swing seat with no added effort to the person sitting on it, which would otherwise be wasted.
- Also system is useful for crushing of waste bottles present in that place.

SCOPE FOR FUTURE WORK

- Different amplifiers may be used to amplify the voltage.

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