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Water Pumping and Power Generation by Swing Action

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***Abstract*—** *This project work describes about lifting the water for the irrigation purpose & generating the power. In day to day life there is a much more use of swing cradle by children, in the swing cradle energy is created through swing action that energy can be used for lifting the water in village area as well as in gardens. To lift the water, system used is double acting reciprocating pump. The use of swing cradle reduces the cost of centrifugal pump installation. This work proposes the implementation of water lifting and power generation in swing cradle mechanism. 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 the larger sprocket which is pivoted over axis of shaft, causing the angular displacement. This angular movement is converted to rotational motion which is connected to smaller sprocket by chain attachment. The sprocket rotates the spur gear arrangement which runs the dynamo to generate the electricity this set up is done at one side of shaft in swing cradle. Lifting water is done in other side of the shaft is connected to connecting rod and this connecting rod is further connected with reciprocating pump through which water is pumped. This project work is eco-friendly, pollution free, the maintenance cost is less and requires less human efforts.*

***Keywords*—** *Generating power, lifting water, swing cradle.*

I. INTRODUCTION

Energy is the ability to do work. It is a driving force of modern societies and generation and utilization of energy are essential for the socio economic development. Per capita consumption of energy levels are often considered a good measure of economic development. . For human power conversion systems to be useful in the context of developing countries, several constraints need to be considered like low cost, low-resource and limited-skills requirements, low-maintenance, safety and comfort to humans, and environment-friendliness. Human power conversion is easily achieved from children's play under conditions where the children are static relative to the moving playground mechanism, such as seesaw, swing, and merry-go-round. Where the children are in a dynamic state relative to a static mechanism (e.g., swing) it will be difficult to employ cost-effective human power conversion techniques due to considerations of safety and simplicity. A variety of mechanisms are used for conversion of human power to usable electrical or mechanical energy like springs, hydraulic components, electric generators, piezoelectric, compressed air systems, flywheels, and so on. . Improving the efficiency of the conversion system is often essential in the case of individual human power conversion – generally would result in increased cost of the overall system. In the case of several children playing on playground equipment, power is produced as a by-product. Therefore, a low-cost system can be designed and implemented without seriously affecting efficiency, since a large number of children are involved in the play.

II. LITERATURE SURVEY

Atul [1] found that the water is pumped by the pedal operated. Pedalling is the most efficient way of utilizing power from human muscles. To lift the water continuous pedalling it is very much painful to the human muscles that also a human cannot pedal for an hour. Kali charan [2] found that using the pendulum, water is pumped through oscillating motion. But this oscillation motion is not continuous motion a person should lift and drop or either by keeping magnet for lifting and drop it requires human efforts.

III. WORKING PRINCIPLE

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 a large sprocket is attached rigidly, this sprocket pivots over shaft axis when the shaft is displaced. The larger sprocket is attached to a smaller sprocket using chain. The shaft in which smaller sprocket is mounted is connected with the spur gear arrangement. With this arrangement power is generated in the dynamo and stored in the battery. The construction of the swing model is shown in the Fig. 1.

Fig. 1. Construction of the swing model.

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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 the larger sprocket which is pivoted over axis of shaft causing the angular displacement. This angular movement is converted to rotational motion of smaller sprocket by chain attachment. The sprocket rotates the spur gear arrangement which runs the dynamo, thus producing the electricity. The electricity thus produced is stored in a battery by using electric circuits as shown in Fig. 2.

Fig. 2. Power generation.

Other side of shaft is connected with connecting rod and that is connected with reciprocating pump through which water is pumped with the help of to & fro motion as shown in Fig. 3.

Fig. 3. Water lifting.

IV. Advantages and Applications

The merits of developed model are: Pollution free electricity generation.

- This power can be stored in battery array so as to use it further.
- Can be installed at places such as schools, playgrounds, hotel and gardens where mass transit of children is sighted.
- Easy installation and maintenance.
- It can also be used in remote areas where power supply is not available.
- It does not require any operating cost as it is working manually
- It can be installed in any place quickly as compare to solar, wind and other plant.
- It is portable; it can be used as portable power generator.
- It is simple in construction like other conventional part.
- It required small area for installation.

V. Conclusion

In upcoming days the demand of energy resources will be increasing every day's the aim of this project is to develop the world by enriching by utilizing its resources more. Now time has come for using such innovative ideas and it should brought into practice. In this project the mechanism is used to lift the water from one place to another with reciprocating pump. This project is completely based on "simple pendulum". There are many sources to convert from mechanical energy to various forms. In this system no fuel or electrical energy is used. This project gives the overview for the challenges and opportunities for energy lasting in coming decades, this work can make best use of existing technology to ensure reliability and efficiency under changing condition. It outlines the need for cost effective technology in rural region.

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