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INERTIA AGUMENTATION MECHANISM BY USING DUAL MASS FLYWHEEL PUMP

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ABSTRACT

Alternative energy has received more attention in the national and international media as the pollution from fossil fuels becomes more apparent. Global warming and declining air quality are two effects of society's dependence on fossil fuels. By introducing alternative energy sources into your own daily life, you can help to save the environment and reduce your use of the Non-renewable energy resources.

As we are using the Bicycle pedaling method in order to reduce the human effort of the system and to enhance the human comfort level. The Inertia Agumentation Mechanism is generally increases the inertia in the system and helps for the pumping of the water. The system increases the momentum and the inertia which is produced by the dead weight which are mounted on the Planet gears. Thus it acts as the gear revolver and counter acts the dead weights and creates the pumping action which helps to pump the water. Thus the Inertia which is produced by the pedaling action saves the electricity and reduces the human effort required to drive the system.

KEYWORDS: Planet Gears, Inertia, Augmentation, Free Damped Vibrations, Centrifugal Force, Natural Frequency, Excitation, Epicyclic Gears, Vibrations, Electricity

INTRODUCTION

Fundamentals of Alternative Energy

Most of the world's energy sources are derived from conventional sources-fossil fuels such as coal, oil, and natural gases. These fuels are often termed **non-renewable** energy sources. Although, the available quantity of these fuels are extremely large, they are nevertheless finite and so will in principle 'run out' at some time in the future. Renewable or alternative energy sources are essentially *flows* of energy, whereas the fossil and nuclear fuels are, in essence, *stocks* of energy.

Alternative or Renewable energy sources also called non-conventional energy are sources that are continuously replenished by natural processes. For example, solar energy, wind energy, bio-energy - Bio-fuels, hydropower etc., are some of the examples of alternative energy sources.

Alternative energy is best defined by the followings terms

- Energy fuelled in ways that do not use up natural resources or harm the environment.
- Energy derived from sources that do not use up natural resources or harm the environment.

- Energy derived from nontraditional sources (e.g., compressed natural gas, solar, hydroelectric, wind).
- Energy generated from alternatives to fossil fuel. Need not be renewable.

So, growing demands for energy, coupled with diminishing natural resources, has resulted in a demand for the development of renewable energy sources. Human power is one such form of renewable energy that has been used historically to varying degrees. Since the industrial revolution, reliance on human power in the Western World has declined substantially. Despite a decline in practical usage, large amounts of human power continue to be generated by North Americans on a daily basis. Recreational sporting activities are an example of how human power is commonly used. The recovery of energy dissipated during these recreational activities has been proposed and attempted in some small-scale applications. The purpose of this study is to present a number of electrical generation methods that recover metabolic energy spent during recreational activities, and to discuss the feasibility of applying these methods in large-scale energy recovery. Some attention will also be given to the recovery of heat energy generated during metabolic processes.

Many methods of alternative energy generation have been invented and devised; one such method is discussed in this document and is a direct application of energy to pumping.

Pumping Water by Cycling

This section considers the recovery of energy from cycling, since it is the most efficient conversion method.

Figure 1: Bicycle Operated Pump

As per the analysis and case study of ***Adam M. Gilmore,*** **University of Guelph,** ***Canada***, the most energy efficient method of recovery with the most potential for a useable power yield is pedal generation. This case study will therefore discuss how this method can be used for recovery in a large-scale fitness facility. E.g. The facility has 14 exercise bikes, and the average daily usage for all bikes is 5 hours/day out of the 8 hours/day the facility is open. The facility is open 7-days a week, year round (assume no holiday closures). The facility has an average daily electrical demand of 100 kWh/day.

Fundamentals of Flywheel

- The pedal operated pump system has variations in the speed of a shaft caused by torque fluctuations. As any human can not apply a uniform torque during pedaling also there are some machine load patterns that cause the

torque function to vary over the cycle which further increases fluctuations, these are reduced with the use of Flywheel.

- A flywheel is an inertial energy-storage device. It absorbs mechanical energy and serves as a reservoir, storing energy during the period when the supply of energy is more than the requirement and releases it during the period when the requirement of energy is more than the supply.

Flywheels-function Need and Operation

The main function of a fly wheel is to smoothen out variations in the speed of a shaft caused by torque fluctuations. If the source of the driving torque or load torque is fluctuating in nature, then a flywheel is usually called for. Many machines have load patterns that cause the torque time function to vary over the cycle. Internal combustion engines with one or two cylinders are a typical example. Flywheel absorbs mechanical energy by increasing its angular velocity and delivers the stored energy by decreasing its velocity.

So the concept is, can we also provide a **Mechanical Advantage** with the help of flywheel.? This leads to generation of Dual-Mass flywheel system which increases the power at output by usisng a epicyclic gear train system which explained as below.

Principle of Operation of Dual-mass Flywheel

Dual mass flywheel pump system is an innovative method that utilizes the concept of 'Free un- damped vibrations' in two mass- system. Here all objects vibrate with a particular frequency or regularity. Any motion that repeats itself after an interval of time is called as ***Vibration***.

The figure below shows free un-damped vibrations set up of two mass- two spring system. As shown in the figure the input to the system is in the form of an low energy intermittent input from any power source (excitation), this results in free un-damped vibrations are set up in the system resulting in the free to and fro motion of the mass (m1)& (m2), this motion is assisted by gravity and will continue until resonance occurs, i.e., the systems will continue to work long after the input (which is intermittent) has ceased……***Hence the term free energy is used.***

Vibrations occur wherever there is rotating machinery or moving parts. Vibrations fall basically into two categories namely:

- Vibrations causing noise and machine failure which need to be reduced or completely damped.
- Vibrations those are useful in developing engineering applications in industry, for example vibratory feeders, conveyors and hoppers.

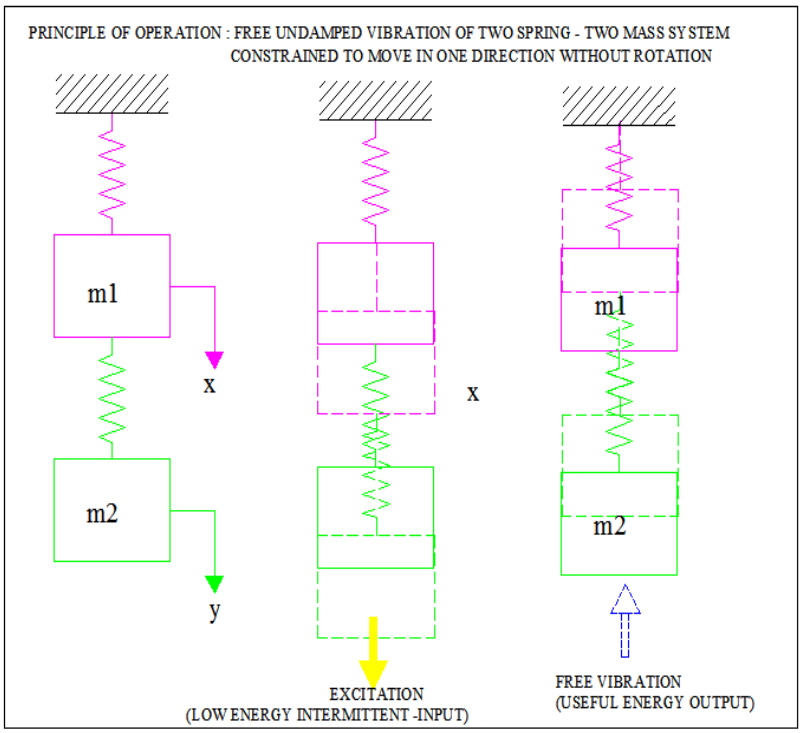

Figure 2: Principle of Operation

LITERATURE REVIEW

Sheila kerr [2005] was a part owner and customer service manager of WINDSTREAM POWER was a successful manufacturer of pedal devices designed to produce electricity. Her father Colin had firstly developed pedaling power generator.

Figure 3: Bicycle Pump System

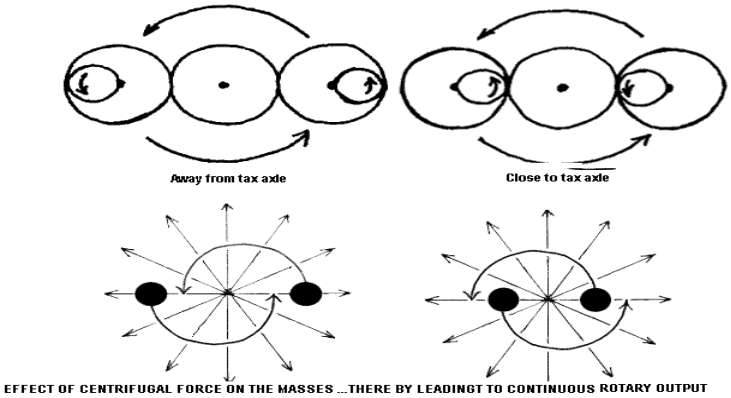

Figure 4: Effect of Centrifugal Force

Dual-Mass Flywheel

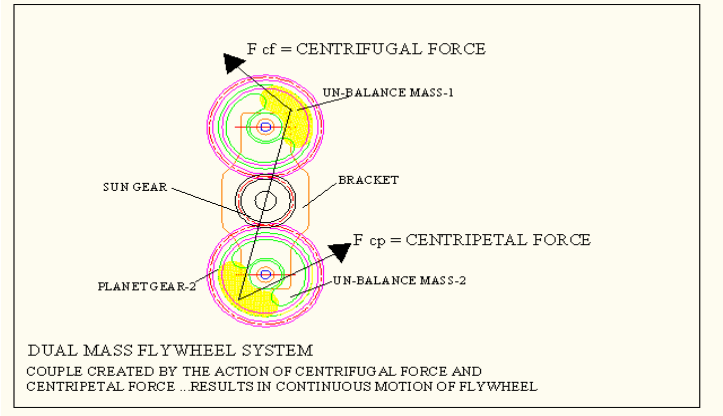

Figure 5: Dual-mass Flywheel

From the above figure it is clear that in addition to the mass of the flywheel, the couple owing to the centrifugal and centripetal forces keeps the flywheel into motion for longer time …thereby increasing the work done by the system…hence the output from the given system increases.

Application of the dual mass flywheel system is done to manually operated bi-cycle pump…first the system is operated without flywheel to plot the characteristics and find discharge in given time (t).

Then the dual mass system is used to see the change in characteristics and discharge in same given time (t).

Thereby proving the effectiveness of the dual mass flywheel in reducing human effort in pumping given volume (v) at given discharge (q).

OBJECTIVES

- Energy fuelled in ways that do not use up natural resources or harm the environment, no pollution.
- Energy derived from sources that uses an entirely un-conventional energy conversion device. With minimal energy input.
- Better effectiveness over conventional method utilizing human effort or continuous supply of electric energy.

- High on useful work done……. Low on power consumed.
- Positive displacement ensures effective or high delivery head. Hence advantageous over velocity pumps.
- Low installation cost.
- Low running cost.
- Low maintenance.

CONCLUSIONS

- At the time of the energy crisis casting its shadow all over the world, so we should look forward for the alternate energy resources. The kinetic energy of the gears in terms of velocity
- Ratio which is developed by pedaling action, which is used for the pumping of the water. The fundamentals for the pumping action is generally based on the inertia which is developed and it's basically a Inventive form of idea rather than the Innovative form of project. Thus it increases the efficiency of the system and reduces the human effort and saves the electricity which promotes the Eco-friendly Environment and harness the effective form of energy.

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