Energy Ramp

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Energy Ramp

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Abstract

In the present scenario power becomes major need for human life. Due to Day-to-day increase in population and lessen of the conventional sources, it becomes Necessary that we must depend on non-conventional sources for power generation. While moving, the vehicles possess some kinetic energy and it is being wasted. This kinetic Energy can be utilized to produce power by using a special arrangement called "ENERGY RAMP". The Kinetic energy of moving vehicles can be converted into mechanical Energy of the shaft through rack and pinion mechanism. This shaft is connected to the Electric dynamo and it produces electrical energy proportional to traffic density. .All this Mechanism can be housed under the Ramp (slope that has been built to connect two places that are at different levels). The generated power can be used for general purpose like streetlights, traffic Signals. The electrical output can be improved by arranging Energy Ramp in series this generated power can be amplified and stored by using different electric devices. The Maintenance cost of Ramp is almost nullified. By adopting this arrangement, we can satisfy the future demands to some extent.

KEY WORDS: Non-conventional sources, Kinetic energy, Electro-mechanical unit, Energy Ramp, magnetic field.

Dedication

First of all we are very thankful to ALLHA ALMIGHTY who has given us enough courage to complete.

Then

Dedicated to our kind teacher

Saleem Ata & Our Parents

Who enlightened our minds with Knowledge, tried

To include the spirit of hard work and dedicational us

So that we could have a BRIGHT FUTURE in terms

Of being good human and turn out to be competent

Engineers with powers to take challenging

ENGINEERING PROBLEMS

Table of Contents

List of Figures

List of Tables

Chapter 1 Energy Ramp

INTRODUCTION

Before starting I have one question to you all who is really very happy with the current situation of the electricity in Pakistan? I suppose no one. So this is my step to improve the situation of electricity with an innovative and useful concept i.e. Generating Electricity from Energy Ramp. First of all what is electricity means to us? Electricity is the form of energy. It is the flow of electrical Power. Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Many cities and towns were built alongside water falls that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines. How is electricity generated?

Electricity generation was first developed in the 1800's using Faradays dynamo generator. Almost 200 years later we are still using the same basic principles to generate electricity, only on a much larger scale.

The Energy Ramp is directly connected to the Rack (chain) through an iron leg that is used to support the Energy Ramp up and down motion. The Rack is then connected to the Pinion teeth. The Pinion is connected to the Dynamo i.e. the gear box and then the gear box is connected to the Generator. As the car moves over the Ramp it pushes it in the downward direction which is then connected to the Pinion as the pinion rotates it rotates the inner assembly which are the fly wheel and the gear box which eventually moves the generator. Inside the generator the rotor contains a magnet that, when turned, produces a moving or rotating magnetic field. The rotor is surrounded by a stationary casing called the stator, which contains the wound copper coils or windings. When the moving magnetic field passes by these windings, electricity is produced in

them. By controlling the speed at which the rotor is turned, a steady flow of electricity is produced in the windings. These windings are connected to the electricity network via transmission lines.

Now I'm throwing some light on the very new and innovative concept i.e. GENERATING ELECTRICITY FROM ENERGY RAMP. Producing electricity from Energy Ramp is a new concept that is undergoing research. The number of vehicles on road is increasing rapidly and if we convert some of the kinetic energy of these vehicle into the rotational motion then we can produce considerable amount of electricity, this is the main concept of this project. In this project, a Ramp is fitted and some kind of a grip is provided on the Energy Ramp so that when a vehicle passes over Energy Ramp it rotates the Shaft.

This downward movement of Ramp is used to rotate the shaft of D.C. generator by the help of Rack-Pinion. As the shaft of D.C. generator rotates, it produces electricity. This electricity is stored in a battery. Then the output of the battery is used to lighten the street lamps on the road. Now during daytime we don't need electricity for lightening the street lamps so we are using a control switch which is manually operated .The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

1.1 NEED FOR THE MODEL

An energy crisis is any great bottleneck (or price rise) in the supply of energy resources to an economy. It usually refers to the shortage of oil and additionally to electricity or other natural resources. An energy crisis may be referred to as an oil crisis, petroleum crisis, energy shortage, electricity shortage electricity crisis. While not entering a full crisis, political riots that occurred during the 2007 Burmese anti-government protests were initially sparked by rising energy prices. Likewise the Russia-Ukraine gas dispute and the Russia-Belarus energy dispute have been mostly resolved before entering a prolonged crisis stage. Market failure is possible when monopoly manipulation of markets occurs. A crisis can develop due to industrial actions like union organized strikes and government embargoes. The cause may be ageing over-consumption, infrastructure and sometimes bottlenecks at oil refineries and port facilities restrict

fuel supply. An emergency may emerge during unusually cold winters. EMERGING SHORTAGES Crisis that currently exist include;

Oil price increases since 2003 - Cause: increasing demand from the U.S and China, the falling state of the U.S. dollar, and stagnation of production due to the U.S. occupation of Iraq. Iraq is 3rd in the world (besides Saudi Arabia and Iran) for its oil reserves. However some observers have stated the global oil production peak occurred in December 2005. If this is correct it is also to blame. • 2008 Central Asia energy crisis caused by abnormally cold temperatures and low water levels in an area dependent on hydroelectric power. South African electrical crisis Solution for Energy Crisis NEXT time on the roads, don't scoff at the Energy-Ramp. They could actually light up small villages off the highway. This project is about GENERATION OF ELECTRICITY with the ENERGY RAMPS.

Generally when vehicle is in motion it produces various forms of energy like, due to friction between vehicle's wheel and road i.e. rough surface HEAT Energy is produced, also when vehicle traveling at high speed strikes the wind then also heat energy is produced which is always lost in environment and of which we can't make use of….OR directly we can say that all this energy that we can't make use of is just the WASTAGE OF ENERGY that is abundantly available around us. In this project we are just trying to make use of such energy in order to generate an ELECTRICAL ENERGY. This project will work on the principle of "POTENTIAL ENERGY TO ELECTRICAL ENERGY

CONVERSION" Potential energy can be thought of as energy stored within a physical system. This energy can be released or converted into other forms of energy, including kinetic energy. It is called potential energy because it has the potential to change the states of objects in the system when the energy is released if 'h' is the height above an arbitrarily assigned reference point, then Kinetic energy of an object is the extra energy which it possesses due to its motion. It is defined as the work needed to accelerate a body of a given mass from rest to its current velocity. Having gained this energy during its acceleration, the body maintains this kinetic energy unless its speed changes.

Negative work of the same magnitude would be required to return the body to a state of rest from that velocity. The kinetic energy can be calculated using the formula: In this project a mechanism to generate power by converting the potential energy generated by a

vehicle going up on Energy Ramp into kinetic energy. When the vehicle cross over the inclined plates, it gains height resulting in increase in potential energy, which is wasted in a conventional rumble strip When the Ramp comes down, they crank a lever fitted to a ratchet-wheel type mechanism (angular motion converter). This in turn rotates a geared shaft loaded with recoil springs. The output of this shaft is coupled to a dynamo to convert kinetic energy into electricity. A vehicle weighing 1,000 kg going up a height of 0.16m on such a rumble strip produces approximately 1.26 kilowatt power per minute (Let 20% Mechanical losses). So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute.

At present we are facing shortage of electricity. Electricity can be generated using Energy Ramps, strange, isn't it? The benefits from this idea will be to generate electricity for the streetlights, hoardings and then for other use. The functioning will be as follows:

1. The Energy Ramp on a busy road will be lifted from one side and fixed on other side (on one way road)
2. There will be a crankshaft mechanism below the Energy Ramp. The shaft of the generator will be attached to the disc and the rod connected to the disc from the Energy Ramp.

This arrangement will make 1 push as soon as the vehicle moves over the Energy Ramp. There will be electricity storing unit to store the generated electricity during the day and will be used during the night. The manufacturing cost is low. But the installation might be bit expensive but still affordable. Research: the prototype made using a simple dc motor gave an unbelievable output of 12 volts. And the cost of the prototype was just 400 Rs . This proves the feasibility of this project. The idea can be applied on heavy traffic road it works on the principle that when a moving vehicle passes through this set up ,the kinetic energy of vehicle will cause roller to rotate which will further rotate transmission shaft and hence the generator armature (i.e. acting as prime mover to run generator).

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loaded with recoil springs. The output of this shaft is coupled to a dynamo to convert kinetic into electricity vehicle weighing 1,000 kg going up a height of 0.16m on such a rumble strip produces approximately 1.26 kilowatt power (with 20% Mechanical losses). So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute.

1.2 Types of Energy Ramp Used to Generate Electricity

Basically there are three design used to Generate Electricity

I. Roller mechanism

II. Rack- Pinion mechanism

III. Crank-shaft mechanism

1.2.1 Roller Mechanism

A roller blind mechanism for winding and unwinding a roll able blind, the Mechanism comprising a support element, a drive sprocket which is rotatable mounted on The support element for transmitting rotational movement to a blind supporting member, And a manually-movable elongate flexible drive element which includes a plurality of Interlinked tooth-engaging elements, the drive sprocket including a plurality of flexible Teeth engage able with the tooth-engaging elements of the flexible drive element. A roller blind mechanism as claimed in claim 1, wherein a radial extent of the teeth of the drive sprocket is equal to or greater than a maximum dimension of the tooth-engaging elements of the flexible drive element. A roller blind mechanism as claimed in claim 2, wherein the radial extent is equal to or greater than twice the maximum dimension of the tooth-engaging elements of the flexible drive element. A roller blind mechanism as claimed in claim 1, wherein the teeth of the drive sprocket flex in a circumferential direction of the sprocket.

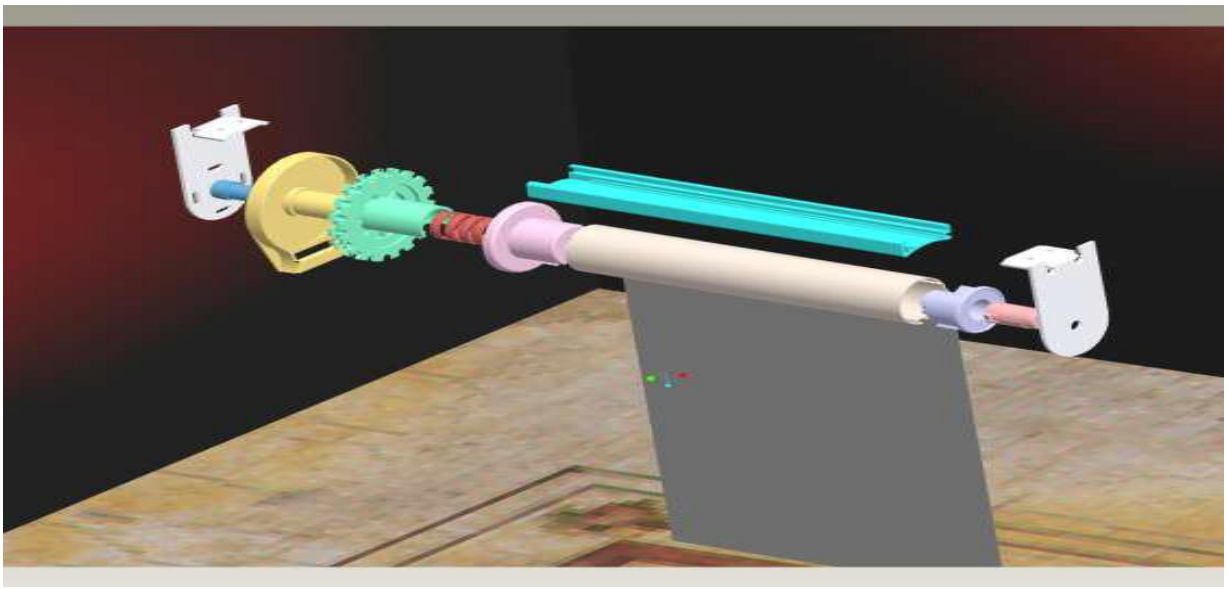

Fig 1.1 Roller mechanism

1.2.2 Rack and Pinion Mechanism

Rack and pinion gears normally change rotary motion into linear motion, but sometimes we use them to change linear motion into rotary motion. They transform a rotary movement (that of the pinion) into a linear movement (that of the rack) or vice versa. We use them for sliding doors moved by an electric motor. The rack is attached to the door and the pinion is attached to the motor. The motor moves the pinion which moves the rack and the door moves.

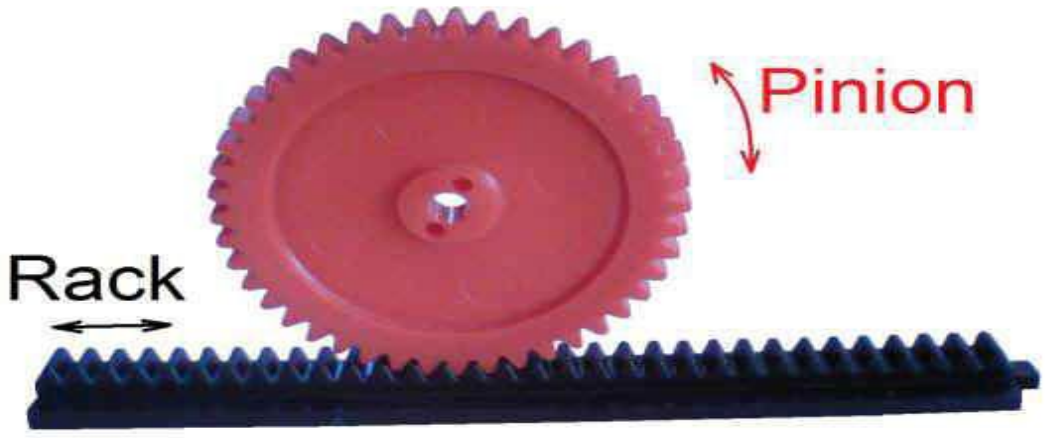

Fig 1.2 Rack and Pinion

1.2.3 Crank Shaft Mechanism

The crankshaft is a mechanism that transforms rotary movement into linear movement, or vice versa.

For example, the motion of the pistons in the engine of a car is linear (they go up and down).But the motion of the wheels has to be rotary. So, engineers put a crankshaft between the engines and the transmission to the wheels. The pistons of the engine move the crankshaft and the movement becomes rotary. Then the rotary movement goes past the clutch and the gear box all the way to the wheels.

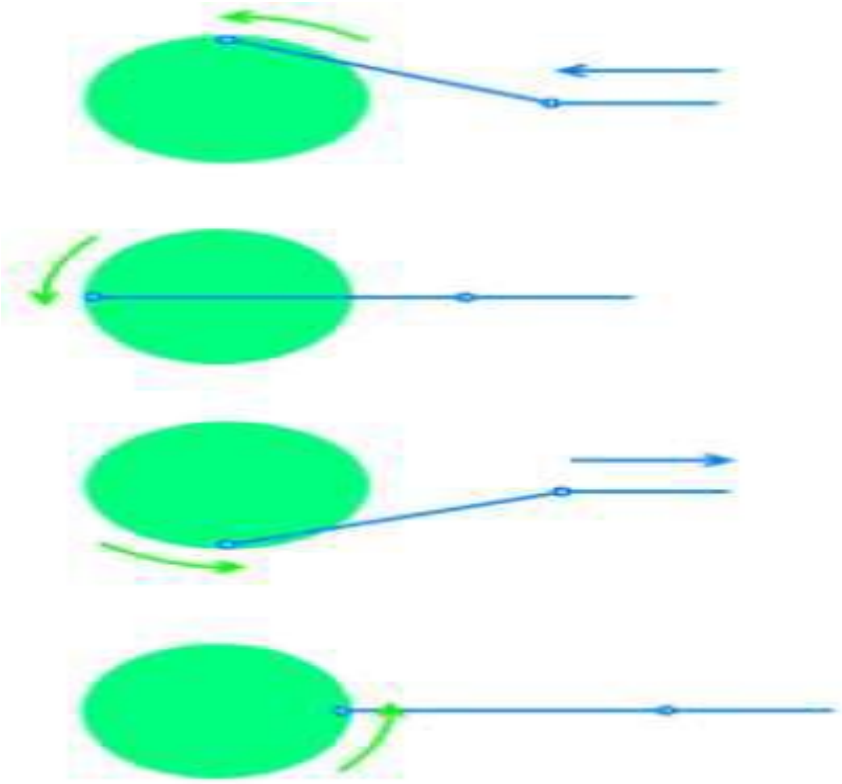

Fig 1.3 Crank shaft

1.3 About Project

Out of these three models, we have chosen Rack and pinion as our project. The theory behind the three design are almost the same, as the Car(load) moves over the path the kinetic energy is

converted into electric energy. We feel that inside of the roller and the crank shaft mechanism this would be more applicable keeping the road condition of our country and vice versa.

1.4 Our Aim

The main aim of our project is to design Energy Ramp using rack and pinion to generate cheap electricity. This project will be provide great use to light up the street lights, a small work place or even a small house.