

Eco-Friendly Pump & Electricity Generator

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Abstract

Eco-friendly Pump and Electricity Generator is an off grid project that aims at pumping water from flowing water bodies like rivers or canals to the nearby areas. Moreover this device can also generate small amount of electricity. Basically this device pumps water without the use of electricity for its operation, instead it works on the energy of flowing water. The flowing water rotates the cylindrical wheel shaped assembly which drives the pump. Thus water is pumped out of the flow and along with pumping this device also generates some amount of electricity with the help of a generator which is mounted on the opposite side of the outlet of water.

Keywords: Concentrated Power Project, coastal cities, industrial waste, and solar thermal energy

I. INTRODUCTION

Eco- friendly pump and electricity generator is a device that pumps water without the use of electricity; instead it works on the energy of flowing water. The flowing water rotates the cylindrical wheel shaped assembly which drives the pump. Thus water is pumped out of the flow and along with pumping this device also generates some amount of electricity with the help of a generator which is mounted on the opposite side of the outlet of water. The construction of this project is simple and the project is made light in weight as far as possible. The entire project assembly is going to be located on flowing water, thus is made in such a way that it can float in water and can easily be located at some position in the flow of water.

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II. PROBLEM STATEMENT

As India is a developing nation citizens of our majority villages still face basic problems of water supply and electricity. This project aims at overcoming this problem to some extent. Farmers have to use electric pumps to pump water from rivers to their farms. But they are still not supplied with adequate electricity from our government, so the use of pump is out of the question. Government is working on this problem but it is going to take many years because the cost of laying down transmission lines is very high. So today still in many remote villages people have to carry water from rivers to their homes.

As we all know that there are approximately 150 to 200 rivers in our country. In north eastern region there are rivers but due to hilly regions and lack of straight roads electricity transmission lines cannot be setup and the people cannot use this basic needs of the 21st century. The region with just five percent of the country's area has thirty percent of the national water resource potential and its per capita water availability is 18,400 cubic meters as compared to the national figure of 2,208 cubic meters. Children of that region have to study under kerosene lamps which would affect their lives in long run. With the help of this project we can generate electricity which would at least serve their basic needs.

III. LITERATURE REVIEW

Water wheels have been known since antiquity. With the industrial revolution, hydraulic sciences were developed and new materials such as wrought iron became available allowing for a rational analysis and improved strength and geometry of water wheels. Contrary to common perception, water wheels did not disappear with the advent of steam engines and water turbines but evolved further so that even at the beginning of the 20th Century tens of thousands of water wheels were in operation, predominantly in Central Europe. Virtually all water wheels disappeared in the 1950's and 60's and little knowledge is available from current text books regarding their design or performance. A detailed study of the available literature covering the engineering design of water wheels was conducted. The design of water wheels was dominated by the requirement for a geometry which would minimize losses, and retain the water as long as possible in the machine. Reports of experimental investigations on the efficiencies of overshot and undershot wheels were also found. Well-designed water wheels can reach efficiencies of 71 (undershot) to 85% (overshot). Some small companies are again manufacturing water wheels for electricity production.

IV. OBJECTIVES

A. Design Objective

The overall goal of our project is to develop a light weight but durable device that will pump water and will also generate electricity with the energy of flowing water.

B. To pump water

The main objective of the project is to generate necessary head and discharge, so that the water is pumped out of the flowing stream with the spiral pump.

C. To generate electricity

The generator should rotate at high rotational speed and to achieve this proper transmission arrangement must be made from the rotating wheel to the generator. For this a sprocket and chain arrangement will be done. The main objective is to minimize the losses in transmission and also get high rpm at the generator.

V. CONSTRUCTION

The construction of this project is very simple. A hollow cylindrical frame forms the core of the project. On this core, hollow pipes are wound as shown in the 'figure 3'. On the same cylinder, vanes are mounted around the periphery at some distance. This distance is left to wound pipes around the cylinder. One end of the pipe is extended outwards on the vanes to pick up water. The cylinder is mounted on a hollow metal shaft. This shaft also acts as pipe. One end of the pipes wound around the cylinder is connected to this hollow shaft at the center of the cylinder. The central shaft is housed in a bearing, which allows it to rotate freely with the flow of water. The bearings are supported on a frame. This frame is light in weight and is made up of hollow PVC pipes or other metal pipes. The entire assembly along with the frame is made floating by placing empty barrels below the frame and tying the frame tightly to it.



Fig. 1: View of Eco-friendly pump

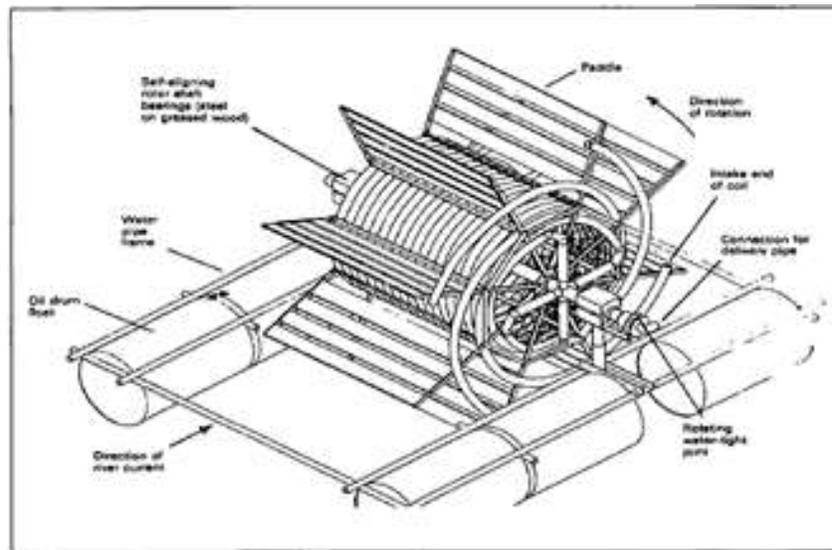


Fig. 2: Combination of spiral pump and water wheel on floating frame

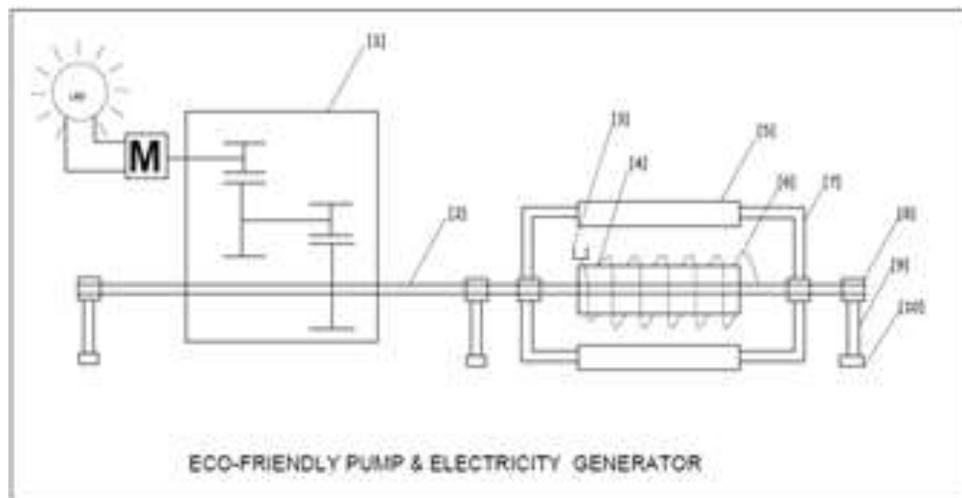


Fig. 3: Diagram showing overview of the project

VI. CONCLUSION

Presently the pumps in use are operated by electric or fuel supply. The current pumps are temperamental and noisy. Therefore it requires maintenance very frequently. As it runs on electricity or fuel, it has high running cost. The proposed model is made up with chip raw materials and is purely independent of either electric or fuel supply. Hence the installation and running cost is greatly reduced. The maintenance problem is also eliminated. Due to this it will be the best option for current pump in rural areas. The different results we have calculated with the help of different parameters such as discharge, head, rpm of wheel structure, torque applied, size of pipe etc. Hence spiral tube water wheel pump is the best substitution for current pump as it can be used in rural areas where frequently breakdown of electricity occurs.

If this project is implemented, some of the problems could be minimized as time money and energy could be saved and can be utilized to do some fruitful work, which would result into increased productivity. Thus this project would be capable of succeeding as a new product in the hydro power industry. Because such a product does not currently exist in the market, the market conditions would be favorable for the introduction of eco-friendly pump and electricity generator.

VII. FUTURE SCOPE

This project can be enlarged in size as per requirement of pressure head and discharge. We can install multiple projects to increase the discharge. The same setup can be used to pump still water by mechanically driving the spiral pump with the help of pedal arrangement. Proper electrical arrangement can be setup for small applications such as charging of batteries, street lighting etc.

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