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Electricity Generation by Human and Bull Driven Mechanism

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ABSTRACT:The main aim of our concept is to arrange the supply of electricity to the areas where there is no supply of electricity yet. This paper highlights small scale electricity generation by renewable energy sources and muscular energy of bull and human being. This system is totally eco-friendly and it is economically affordable. This system implements new technologies in engineering field.

Today also, there are many villages that are facing the load shedding problem of nearly 6-7 hours a day. Therefore, the development of the villages in India is not up to the mark. The development of science has caused adverse effects on the method domestic way of farming. So, the use of bull for farming is decreasing. So, for the preservation of the species of the bull, we have developed a Bull as well as Bicycle-driven, sweep-powered generation scheme. Traditionally, the Bull-driven mechanism used to make juice of sugar-cane. We have modified this mechanism in terms of metallic sprockets and gears assembly to drive the DC Generator. The same generator is to be driven by a human power (i.e. Bicycle mechanism).The bull turbine makes the use of natural power of bull for electricity generation. These concepts can be used by the farmers and also by the people who are living in the areas which are not electrified yet. This enhances the preservation of species of bull.

KEYWORDS:Bicycle Mechanism(Peddalling Arrangement),Metallic Sprockets,GearArrangement,DC Generator

I. INTRODUCTION

According to survey of approximately 70-80% of villages are electrified. But the problem of load shedding i.e 6-7 hours for a day is still facing in many villages. So for the objective of rural development through rural electrification, we developed the bull turbine as prime mover for electricity generation. Due to advancement in science nowadays the new techniques have been implemented by most of the farmers. So, they use tractors for their work in the farmlands. Due to these, the use of Bull for the farmlands has much decreased. The species of the animal named Bull is in danger. It is very important to save the Bull species but in a positive way. And from the ancient times the Bull is used for the heavy duty work.

So, we started thinking that how we can use the natural power of the Bull for the generation of electricity which may benefit the village & also the species of the Bull will be saved. And the study on this concept gave rise to the system named “Bull Turbine”. So, we started working on this concept as an experiment.

The Bull energy generation system will surely prove to be useful in case of electricity generation & also it will cause a very less adverse effect on the environment. It is also cost-effective, affordable to the village people.

So, our aim is to try to work on this concept & develop it for the benefit of the poor people.



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II. ENERGY FLOW DIAGRAM



Energy Flow Diagram of Bull Turbine

BULL POWER CALCULATION

The power produced by bull and also the force depends on weight of bull and the duration of work to be done. Power is nothing but rate of work done. The power and force reduces as the duration of work increases. Bull can produce force equivalent to 1/8 th of its weight for 6 hours of continuous work. So, for 1 hour, bull can produce a force equivalent 6/8 of its weight.

Let, average weight of 1 bull is 250kg.

$$Force = Weight \times 9.81$$

$$= \left[\frac{6}{8} \right] \times 250 \times 9.81$$

$$= 187.5 \times 9.81$$

$$= 1839.375 \text{ Newton}$$

$$Torque = Force \times Distance$$

$$= 1839.375 \times 3$$

$$= 5518.125 \text{ N – m}$$

$$Power = \frac{2\pi NT}{60}$$

$$Power = \frac{(2 \times 3.14 \times 2 \times 5518.125)}{60}$$

$$= 1115.1275 \text{ Watts}$$

i.e. 1.5 HP

Thus power produced by 1 bull is 1.5HP. The speed of bull is 2.4 to 3km/Hr. So bull completes 2-3 rotations in One minute in periphery of 3m radius.

HUMAN DRIVEN GENERATION SCHEME

Here we have introduced a mechanical drive arrangement driven by humans to rotate the same generator used in bull turbine system. Humans go to gym for daily exercise and burn the calories which is a waste. This muscular energy wasted in gym can be used to generate electricity. The generator will be driven by human through drive mechanism at variable speed as much possible by the human. The speed may not be as high as that obtained by bull power but the rotations obtained will be sufficient to generate electricity as we know that when there is energy input there will be some output.

For determining the maximum human power output, the weight to power ratio is considered. It is as follows:

The average fit person can produce about 3 watts/kg top amateurs produce 5 watts/kg and elite athletes achieve 6 watts/kg

The average fit person can produce about 3 watt/kg according to power to weight ratio. We considered 70 kg weighted person who can produce up to 210 watt power.

The average calories burnt by human in gym are 200 kcal. This energy will be converted to electricity.

210 watt= 210 Joules/sec

1 calorie = 4.2089 Joules

So for 1 hour, energy=210*60*60=756000 Joules

Calories burnt=756000/4.2089=180Kcal

Therefore dietary calories = 180 Calories

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FORCE AND TORQUE GENERATED BY HUMAN

340 +/- 65.0 and 377 +/- 74.8 N for the first and final minute, respectively

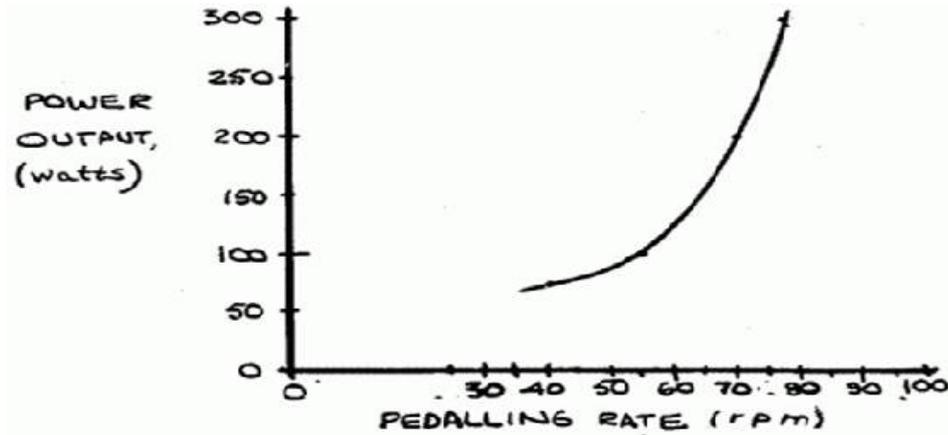
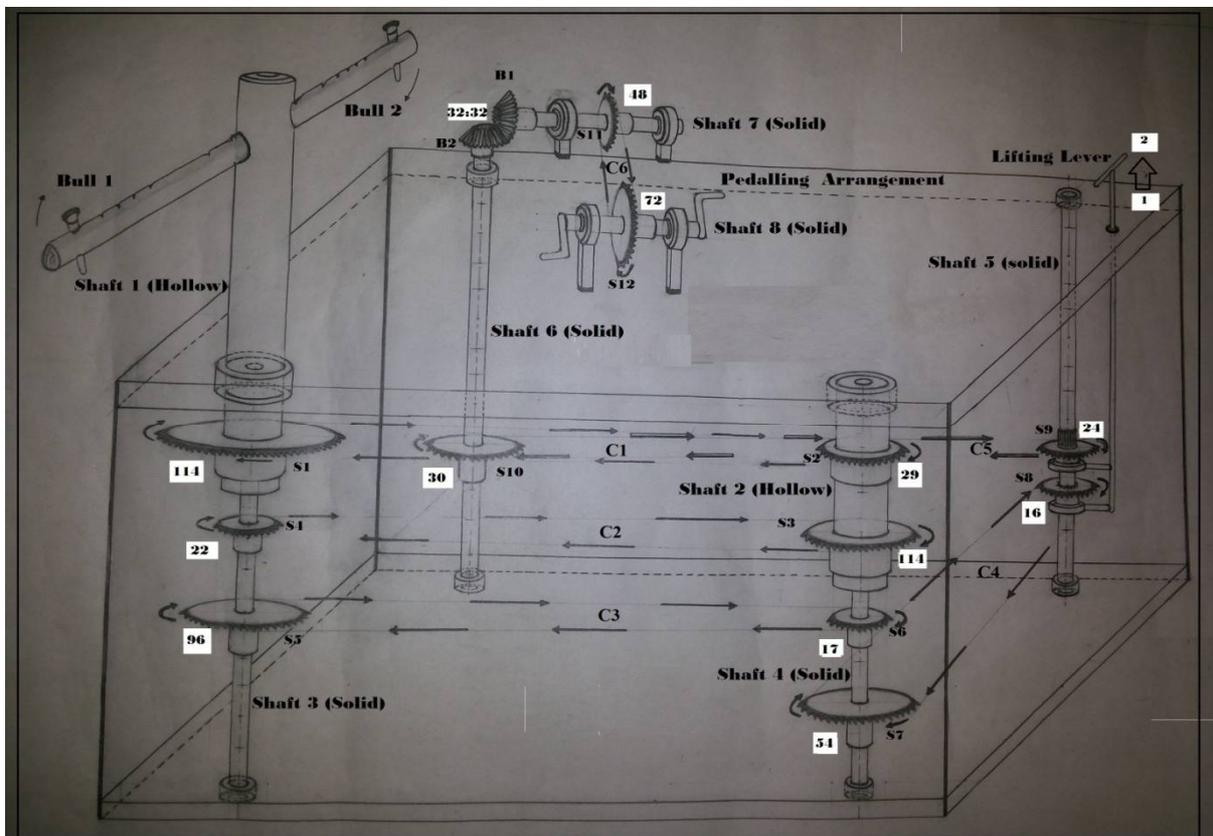


Fig 3.1 dependency of power output on pedaling rate

As shown in the above graph, the output power goes on increasing as the pedaling rate increases. This graph is for showing the general idea about the effect of pedaling rate on the power output.





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III. PROPOSED MODEL

In above Proposed Model at Shaft 1 Bull arrangement is shown and when bulls are not available then we can use pedalling arrangement i.e. Shaft 7 & 8 we can also name it Human driven mechanism. With this arrangement we can generate electricity.

Advantages

1. Higher efficiency of operation.
2. Low rate per unit consumed.
3. Preservation of species of bull is achieved.
4. Preservation of natural resources such as fossil fuel.
5. Reduction in dependency on natural resources from foreign countries.
6. The rural electrification is achieved as we generate electricity when we required.
7. Low capital cost, low maintenance & effective power generation.
8. No emission of any type of gases, so the system is Pollution free.

Disadvantages

1. High coupling & frictional losses due to gearing arrangement & chain drive arrangement.
2. Bull is to be available at the sight.

APPLICATION AREAS

1. Rural Electrification
2. Commercialization
3. Battery charging unit
4. Distributed generation and network
5. Self generation
6. Generation by bicycle mechanism
7. Micro grid
8. Promoting renewable energy
9. Bull Preservation
10. Demand Side management

IV. CONCLUSION

To promote the use of various renewable energy sources we have introduced this concept. Also there is lot of scope for the new way of power generation i.e using bio mechanical power generation scheme so we introduced animal driven and human driven power generation scheme. The systems proposed in this project are not only ecofriendly but also cost beneficial. We also promote distribution power generation scheme. Thus , the electricity can be available all the times whenever we need.

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