
Design and Fabrication of Hand Water Pump Operated By a Pendulum

Rajesh Kumar Sahu*, Rakesh Kumar Das**, Supriya Dip***
& Sidhartha Mohapatra****

*Lecturer, Department of Mechanical Engineering, Gandhi Institute of Engineering & Technology, Gunupur Rayagada, Odisha India

**B. Tech Final Year Mechanical Engineering Student, Department of Mechanical Engineering, Gandhi Institute of Engineering & Technology, Gunupur Rayagada Odisha India

***B. Tech Final Year Mechanical Engineering Student, Department of Mechanical Engineering, Gandhi Institute of Engineering & Technology, Gunupur Rayagada Odisha India

****B. Tech Final Year Mechanical Engineering Student, Department of Mechanical Engineering, Gandhi Institute of Engineering & Technology, Gunupur Rayagada Odisha India

ABSTRACT

This Paper includes the importance of hand water pump using pendulum rather than using simple hand pump. One important feature of this pump with a pendulum is that the work is alleviated which makes work rather easier compared to a traditional hand water pump. It is used due to efficient mode in irrigation of smaller lots, water-wells and also used to extinguishing fires even by old people and children. With the help of pendulum based water pumping system that can increase the efficiency of the plant and reduce effort, cost of production, production time, manpower requirements.

Keywords: *Oscillating pendulum, reciprocating pump, spring, work alleviation, energy conservation, dexterity*

1.0 INTRODUCTION

Hand water pump is the best solution to lift the water without using electricity. But it requires a large human effort which is not feasible for long time. When we need the supply of water continuously this is not the best solution to lift water continuously. So Hand water pump with pendulum is the best solution for pumping water without using the hand pump. This is providing alleviation of work, because it is enough to move pendulum occasionally with little finger to pump water, instead of large swing. With the help of hand water pump work is alleviated became easier, long-lasting and Effortless to use the pump.

A pump is also a device which can be used to transfer fluid. This pump is not only selected to raise and transfer fluids from one point to another point but also it meet some other criterion. The other criteria may be obtained with a constant flow rate according to the requirements.

The main importance of pendulum based water pump is that the initial energy for starting the process, swing the pendulum is considerably minimum compared with work required to operate hand pumps. Typical hand pumps need large effort and an average person can pump continuously for a short period of time, but the water pump system need little effort, because it oscillate the pendulum and maintain the oscillation for several hour, without any fatigue. Large amount of electric energy can save with this process. With this process we can conserve energy and that energy can be used in various other purposes. The main advantages of this invention as compared to present hand pump are: it requires less force to start the pump, water consumption is less, and both arms are used to fetch water.

1.1 Literature Review

CARL A. KUEHN, citizen of the united states has invented new and most useful system named as pendulum based water pump system in which the power to operate the pump has divided from pendulum spring-motor. His invention is simple to operating deep-well and where there may be little wind or limited amount of fuel for power purpose.

Morden pump require electricity and ancient pump require more effort.so, the system will developed and with this system all categories of people can get more with less effort.

- 1588-VANE WATER PUMP
- 1687-CENTRIFUGAL PUMP
- 1857-SUCTION & LIFT HAND PUMP
- 1949-BUCKET TYPE WATER PUMP
- 1953-GEAR PUMP
- 1999-TWO STAGE OSCILLATOR PUMP BY SIR VELJKO MILKOVIC
- 2012-PENDULUM PRINCIPLE FOR BUCKET PUMP

Pendulum pump is a two stage oscillator in where two pendulums are used called as compound pendulum. Where energy of one pendulum transfer to other pendulum. In 1999, sir, Veljko Milkovic invented two stage pendulum pump system.

1.2 Objectives

The objectives of the project are:

- Design and develop the figure for pumping water using pendulum principle.
- Reduce human effort.
- Achieve continuous discharge of water through pump.
- Ensure safe operation of pump.

2. DESIGN

2.1 Frame

It is the main part of the pump system and it is made up of steel. The cycle frame consists of seven rigid links which convert the pendulum movement to the piston movement.

2.2 Reciprocating Pump

This is a positive displacement pump. This is closely fitted with cylinder by the principle of actual displacement or a plunger which executes a reciprocating motion.

2.3 Springs

Spring is an elastic object which store mechanical energy. Here, In this system both tension and compression springs are used. The function of tension and compression springs to stretch and compress according to load applied.

2.4 Weight Hanger

Weight hanger is used for holding the weight. It is also the oscillating part of the system, thus it acts as a pendulum.

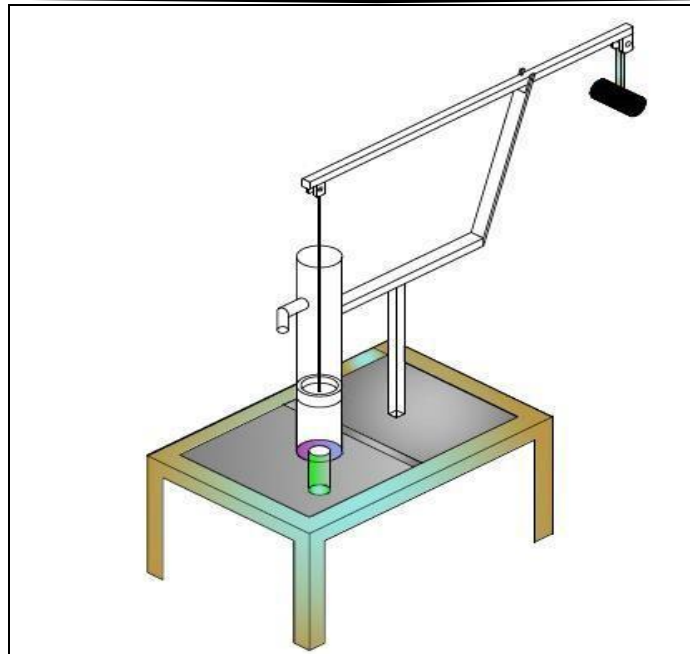


Figure: 1 working model of pendulum based water pump system

3. FABRICATION OF PENDULUM BASED WATER PUMP SYSTEM

Steps of fabrication of pendulum based water pump are as follows:

1. Collecting the required raw materials
2. Cutting the metal bars to required size
3. Fabrication of frame as per the design by utilizing the metallic bars
4. Fixing of reciprocating pump to the frame
5. Placing the lever at the correct position
6. And fabrication of pendulum to the lever end



Figure: 2 working project

4. WORKING FLOWCHART OF PENDULUM PUMP

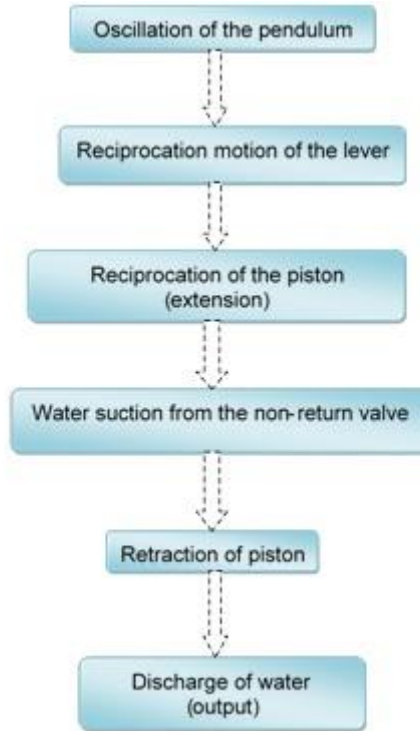


Figure: 3 flowchart of operation

5. RESULTS AND ANALYSIS

Various parameters that determine output discharge of pendulum pump are analysed and results are plotted. Analysis parameter includes mass of pendulum, swing angle, length of the pendulum.

5.1 Analysis of mass of the pendulum

Discharge is found by changing mass of pendulum by maintaining maximum swing angle and maximum length of the pendulum.

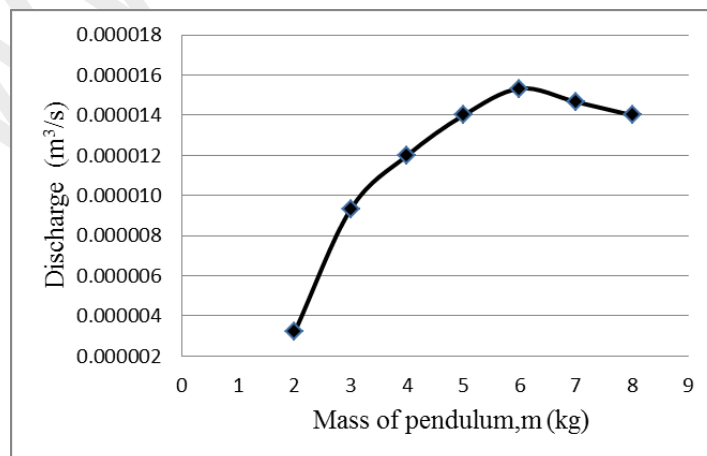


Figure: 4 Mass of pendulum (m) vs Discharge

5.2 Analysis of length of the pendulum

Discharge is found by varying the length of pendulum without changing mass of pendulum and the swing angle.

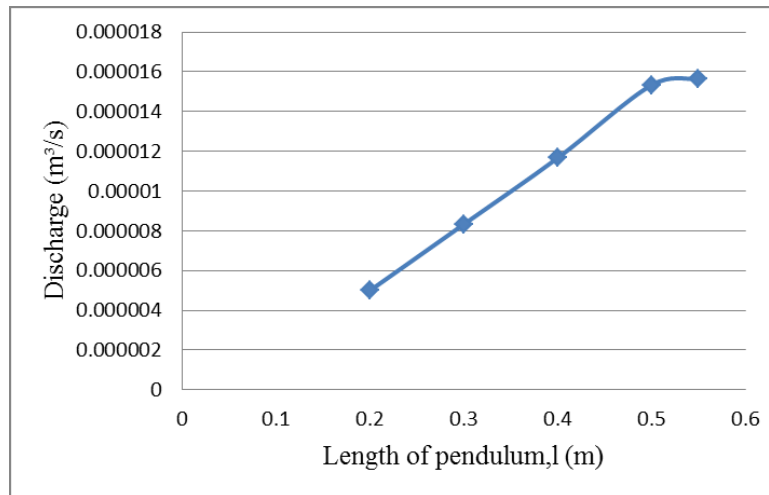


Figure: 5 Length of pendulum (l) vs Discharge

6. ADVANTAGES

- It takes minimum human strength as compared to present classic hand water pump.
- In comparison to hand pump energy required to initiate the pumping process significantly less for pendulum pump.
- Less water consumption.
- Compact size, relocate is easy, less moving parts, hence less is the maintenance cost.

7. FUTURE SCOPE

- It can use where shortage of power is a major issue.
- From experimentation it concludes that system is practically feasible.
- It conserve large amount of energy.
- The system is more efficient, minimum effort is required.

8. CONCLUSION

The free energy of machine based on oscillation pendulum-lever system, is defined in this study, as a difference between resulting energy of machine and energy input from the environment in same time interval. Existence of free energy defined in this way is not in accordance with energy conservation law, but it has been verified experimentally and it can be explained.

Machines based on the operation of two-stage oscillators can have efficiency coefficient significantly higher than one. This conclusion is verified by a series of experiments done so far with two-stage oscillator systems of different dimensions and different user system.

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